

Revised Final Independent External Peer Review Report for the Engineering and Economic Reevaluation of the Geotechnical, Hydrological, Hydraulic, and Economic Aspects of Flood Risk Reduction Report, American River Common Features

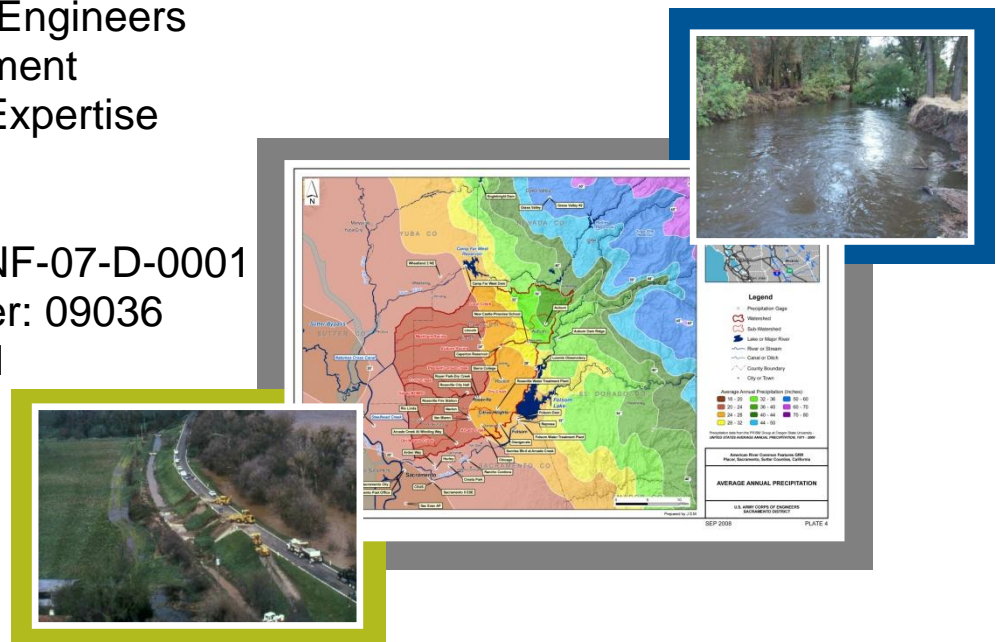
Optional Increment – Draft Natomas Post-Authorization Change Report and Draft Environmental Impact Statement

Prepared by
Battelle Memorial Institute

Prepared for
Department of the Army
U.S. Army Corps of Engineers
Flood Risk Management
Planning Center of Expertise
Sacramento District

Contract No. W911NF-07-D-0001
Task Control Number: 09036
Delivery Order: 0591

September 16, 2010



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SHORT TERM ANALYSIS SERVICE (STAS)

on

**Revised Final Independent External Peer Review Report
Engineering and Economic Reevaluation of the Geotechnical, Hydrological, Hydraulic,
and Economic Aspects of Flood Risk Reduction Report, American River Common Features**

**Optional Increment – Draft Natomas Post-Authorization Change Report and Draft
Environmental Impact Statement**

by

**Battelle
505 King Avenue
Columbus, OH 43201**

for

**Department of the Army
U.S. Army Corps of Engineers
Flood Risk Management Planning Center of Expertise
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Scientific Services Program

The views, opinions, and/or findings contained in this report are those of the author and should not be construed as an official Department of the Army position, policy, or decision, unless so designated by other documentation.

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**REVISED FINAL
INDEPENDENT EXTERNAL PEER REVIEW REPORT
for the**

**Engineering and Economic Reevaluation of the Geotechnical, Hydrological,
Hydraulic, and Economic Aspects of Flood Risk Reduction Report,
American River Common Features
Optional Increment – Draft Natomas Post-Authorization Change Report and Draft
Environmental Impact Statement**

EXECUTIVE SUMMARY

The American River Common Features project (Common Features) is being developed to provide flood risk management to the City of Sacramento, California, including the Natomas Basin and areas along the north and south sides of the American River. A fast-growing region in the country's most populous state, the Greater Sacramento area encompasses the floodplains of two major rivers—the Sacramento and the American—as well as additional rivers and tributaries that drain the Sierra Nevada mountains. Expanding urban centers lie in floodplains where flooding could result in extensive loss of life and billions of dollars in damages.

Authorized in 1996, the Common Features project consists primarily of levee creation and modification, in addition to flood warning systems and pumping capabilities. However, since authorization, increased understanding of underseepage and through seepage problems that jeopardize levee stability have substantially increased project costs. Consequently, a general engineering and economic reevaluation is necessary to determine if the alternative proposed is still viable and justified and if there is another alternative that may be more effective. The American River Watershed Common Features Project General Reevaluation Report (GRR) includes flood risk management to the City of Sacramento and the Natomas Basin. The purpose of the GRR is to develop analysis tools that consider the flood protection system as a whole and to identify a comprehensive plan that will lower the risk of flooding in and around Sacramento. The objective of this study is to reevaluate the currently authorized plan, as well as to develop and evaluate other viable alternatives, including a locally-preferred plan.

Having completed the initial increment of the independent external peer review (IEPR) of documentation of the existing geotechnical conditions documentation for the American River Common Features project, the U.S. Army Corps of Engineers (USACE) is conducting an additional IEPR of investigations to analyze the conditions that would result from implementing project alternatives. Recently it has been determined that a “Natomas Post-Authorization Change Report (PACR)” will be prepared in lieu of the Common Features GRR. The decision provides more focused technical investigations that are responsive to the Federal legislative calendar.

USACE is conducting an IEPR (also referred to as an optional increment or second work increment) of the Draft Natomas Post-Authorization Change Report (“Draft Natomas PACR”). Battelle, as a 501(c)(3) non-profit science and technology organization with experience in establishing and administering peer review panels for USACE, was engaged to coordinate the IEPR of the Draft Natomas PACR. Independent, objective peer review is regarded as a critical

element in ensuring the reliability of scientific analyses. The IEPR was external to the agency and conducted following USACE and Office of Management and Budget (OMB) guidance described in USACE (2010), USACE (2007), and OMB (2004). This final report describes the IEPR process, describes the IEPR panel members and their selection, and summarizes the Final Panel Comments of the IEPR Panel (the Panel).

Based on the technical content of the Draft Natomas PACR and the overall scope of the project, five panel members with technical expertise in geotechnical engineering, hydraulic engineering, and economics who participated in the initial IEPR increment were reengaged for this IEPR. One additional panel member with technical expertise in National Environmental Policy Act (NEPA) impact assessment was selected for the optional IEPR increment. Although the Panel was disclosed to USACE, Battelle made the final decision on selecting the Panel.

The Panel received electronic versions of the Draft Natomas PACR documents, along with a charge that solicited comments on specific sections of the documents to be reviewed. The charge that was to guide the peer review was developed by the USACE, according to guidance provided in USACE (2010) and OMB (2004). USACE provided Battelle with draft charge questions for inclusion in the draft and final Work Plan for the second work increment.

The USACE Project Delivery Team (PDT) briefed the Panel and Battelle during a kick-off meeting held via teleconference prior to the start of the IEPR. Other than this teleconference, there was no direct communication between the Panel and USACE during the peer review process. Panel members conducted reviews of appendices within their own discipline (e.g., the economics panel member reviewed the Economics Appendix), and all panel members reviewed the Draft Natomas PACR main report. The Panel produced more than 300 individual comments in response to 119 charge questions.

IEPR panel members reviewed the Draft Natomas PACR documents individually. Following the individual reviews of the technical appendices by the IEPR panel members, four panel review teleconferences by document and discipline were conducted to review key technical comments, discuss charge questions for which there were conflicting responses, and reach agreement on the Final Panel Comments to be provided to USACE. Following the individual reviews of the Draft Natomas PACR main report, a fifth panel review teleconference was conducted with all six members of the IEPR Panel to review key technical comments, discuss charge questions for which there were conflicting responses, and reach agreement on the Final Panel Comments to be provided to USACE. Each Final Panel Comment was documented using a four-part format consisting of the following: (1) a comment statement; (2) the basis for the comment; (3) the significance of the comment (high, medium, or low); and (4) recommendations on how to resolve the comment.

Tables ES-1 through ES-6 summarize the Final Panel Comments by level of significance. Detailed information on each comment is contained in Appendices A through E of this report. Overall, 35 Final Panel Comments were identified and documented. Of these, 6 were identified as having high significance, 15 had medium significance, and 14 had low significance. For the individual reviews of the Draft Natomas PACR technical appendices, the panel members' Final Panel Comments were focused on documents within their own disciplines (see Final IEPR

Report Appendices B through E). All panel members agreed upon the Final Panel Comments listed for the Draft Natomas PACR main report (see Final IEPR Report listed in Appendix A). Tables ES-2, ES-3, ES-4, ES-5, and ES-6 summarize Final Panel Comments by document, level of significance, and appendix location in the Draft Natomas PACR (e.g., Final Panel Comment A01 is located in Natomas PACR Appendix A, B01 is located in Natomas PACR Appendix B, etc.). Furthermore, detailed information on each Final Panel Comment is contained in Appendices A through E of this Final IEPR Report.

Table ES-1. 35 Final Panel Comments Summarized by Document/Discipline and Significance Rating.

Document/Discipline	IEPR Report Appendix ^(a)	Panel Members Tasked with Review	Total No. of Final Comments	No. of Comments by Significance Rating		
				High	Medium	Low
Draft Natomas PACR Main Report	A	6	11	4	5	2
Appendix A – Draft Environmental Impact Statement/Draft Environmental Impact Report (DEIS/DEIR)	B	1	6	1	2	3
Appendix B Hydrology and Appendix D Hydraulic Design	C	1	11	0	2	9
Appendix F – Geotechnical Analysis	D	3	3	0	3	0
Appendix H – Economics	E	1	4	1	3	0
Total			35	6	15	14

^(a)Full Final Panel Comment provided in Appendices A through E of this report.

Table ES-2. Overview of 11 Final Comments on the Draft Natomas PACR Main Report Identified by the Natomas PACR IEPR Panel.

Significance – High	
A01	The sequence of the plan formulation process appears to be incomplete and is hard to follow; therefore, it is difficult to determine whether the National Economic Development (NED) Plan has been correctly identified.
A02	The discussion of induced development as it relates to Executive Order 11988 requires clarification.
A03	The assumptions that underlie the economic analysis need to address the discrepancy in the Without-Project Conditions that might affect plan formulation.
A04	The Post-Authorization Change Report (PACR) does not explain the alternative for the closing of the Sankey Road Gap.
Significance – Medium	
A05	The most recent version of the report should reference the Environmental Impact Statement (EIS) as a report Appendix for the overall project.

A06	A conclusion or analysis on how past and current related studies or projects affect the Natomas Basin or how the proposed plan affects the overall flood risk management system needs to be included.
A07	The technical considerations contained in the rationale for eliminating certain alternatives should be further developed and results of evaluations documented.
A08	The non-structural measure of buyouts/permanent relocations needs to be addressed in the main report.
A09	Public comments on the Natomas PACR need to be addressed in the report.
Significance – Low	
A10	The Post-Authorization Change Report (PACR)/Interim General Reevaluation Report (IGRR) could be improved by referencing the report appendices, thereby directing the reader to more in-depth discussion of the technical details which form the basis of the conclusions.
A11	Minor suggested changes to the document are recommended to improve the readability and understanding of the report.

Table ES – 3. Overview of 6 Final Comments on Appendix A (DEIS/DEIR) Identified by the Natomas PACR IEPR Panel.

Significance – High	
B01	Prehistoric Native American residents of the project area are not covered by Executive Order 12898 (Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations) and should be discussed separately.
Significance – Medium	
B02	Construction timing related to the presence of Swainson's Hawk and the anadromous fish species should be clarified as to the potential for impacts to those species.
B03	The likelihood of Native American remains in the project area is not well documented and the interpretation of such remains as a significant effect warrants further justification.
Significance – Low	
B04	The overall readability of the document could be improved by incorporating additional details and some reorganization to the plate illustrations.
B05	The final use for topsoil that has been stripped from farmable land areas should be reconsidered for locations where the borrow area will be transformed as detention ponds or managed wetlands.
B06	The discussion of Impacts to Fish and Aquatic Habitats is not well constructed and not thoroughly supported.

Table ES-4. Overview of 11 Final Comments on Appendix B (Hydrology) and Appendix D (Hydraulic Design) Identified by the Natomas PACR IEPR Panel.

Significance – Medium	
C01	The assumption of “no hydraulic impacts” is unclear and may not be appropriate under the With-Project Condition.
C02	The assumption of stage-frequency relationships for reaches F, G, and H as described in the first paragraph of Section 4.1 in Appendix D is not well supported by Figure 2-14.
Significance – Low	
C03	The approach for generating peak flow frequency curves for Dry and Arcade Creeks should be clarified by providing the relationship for the development of peak flows, and a statement discussing the amount of floodplain storage being utilized in the routing of flood flows.
C04	A clarification of the higher FLO-2D water surface elevation relative to the HEC-RAS water surface at the upstream end of Figure 1-8 needs to be provided.
C05	The location of the storage areas in relation to cross section locations in the HEC-RAS model is unclear.
C06	Method 2 of the procedure for the downstream boundary condition requires some additional clarification to be differentiated from Method 1.
C07	The effect of the datum differences on frequency-damage curves for the Natomas Basin needs additional clarification.
C08	The discussion of hydraulic uncertainty in Section 4.2.1 requires clarification.
C09	Figures 2-14, 2-17, and 2-20 should label the pump station location along the profile to avoid confusion.
C10	The adjustment to the 2-year stages provided in Section 4.1 need additional details.
C11	It is unclear whether the discussion of the backwater effects on levee breaches in the HEC-RAS model pertains to tailwater on the other side of the breach, or backwater from another flooding source.

Table ES-5. Overview of 3 Final Comments on Appendix F (Geotechnical Analysis) Identified by the Natomas PACR IEPR Panel.

Significance – Medium	
D01	Document readability and clarity of Appendix F would be improved by including an additional figure at the beginning of the document labeling levee miles within each reach.
D02	Document readability and clarity could be improved by showing Without-Project and With-Project combined fragility curves.
D03	A validation of historical experience of flood height and levee performance should be provided to support the fragility curve for levee failure, which seems high for some reaches.

Table ES–6. Overview of 4 Final Comments on Appendix H (Economics) Identified by the Natomas PACR IEPR Panel.

Significance – High	
E01	The incremental analysis floodplain assignments (i.e., water surface profiles) used to perform the increments, or order of fixes, is unclear.
Significance – Medium	
E02	The technical soundness and clarity of the incremental benefit analysis could be improved by performing a “Last Added” increment as a separate action.
E03	A detailed narrative on the major economic assumptions is provided, but does not address the likelihood that the proposed modifications assumed for the NA3 condition will occur.
E04	The sensitivity analysis that was performed on the Without-Project damages and With-Project benefits is well supported and documented but needs to be clarified.

The IEPR panel members agreed that, in general, the Post-Authorization Change Report and Interim General Reevaluation Report and related appendices were adequate and acceptable in terms of the methods, models, and analyses used. The American River Watershed Common Features Project for the Natomas Basin is an extensive and complex undertaking. The phased approach to implementation of this project and the research that have gone into the various stages of the overall project are well documented, as was the historical background for the current project, including earlier flood events, changes in hydrologic conditions, and land use. The discussion of the purpose and need, project scope, goals, and objectives were clearly outlined and described. While the report appears to be technically sound, the Panel would like to see additional clarity regarding plan formulation so that the technical detail supports the need for the overall project.

According to the charge for independent review, the Panel was responsible for review and comment on the Post-Authorization Change Report and Interim General Reevaluation Report and related appendices. The following statements provide a summary of the Panel’s findings, which are described in more detail in the Final Panel Comments (see Appendices A through E).

Economics:

The documents reviewed provide good background information regarding the Natomas Basin including the Economic Impact Area, field inventory characteristics, and value of damageable properties by structure type. The report also provided a detailed explanation of the economic methodology, which included identifying nonstructural and structural alternatives, an incremental analysis to optimize the measures, and a thorough and logical plan formulation.

The documents reviewed need clarification regarding the assumptions used in the Without Project Conditions, a Last Added analysis and an analysis regarding the overall flood risk management system and how the Natomas Basin is affected.

Engineering:

This report was well organized and easy to understand. The geotechnical discussions and conclusions present in the report are based on extensive geotechnical explorations and comprehensive analysis. The proposed remediation measures are well supported by the analysis and seem effective, reasonable, logical, and well organized. However, the Panel suggests minor improvements to the presentation of the geotechnical aspects of the project by including the labeling of levee miles on the figures to permit the reader to better understand the areas being discussed and by better referencing of the geotechnical appendices within the main report. The fragility curves used in the Risk and Uncertainty analysis needed to be better correlated. There also could have been a better incorporation of the historic flood levels to the probability of failure analysis.

On the whole, the Hydrology and Hydraulic Engineering documents in the Natomas Post Authorization Change Report did an excellent job of anticipating comments based on previous panel review of the American River Common Features General Reevaluation Report, and they provide a good base from which to build the project and begin building the alternative formulation. The methods, models, and analyses appear to be appropriate and acceptable with respect to the engineering aspects of the project. For example, the overall layout and presentation of the document is generally systematic in its approach and flows fairly well.

However, the documents still need some clarity to adequately describe the interaction between the HEC-RAS and FLO-2D models to produce frequency-damage relationships for use in the economic analyses given the difference in datums. Other critical issues relate to the description of the “with project” conditions and the derivation of stage frequency relationships in the H&H appendices, and documentation of the plan formulation sequencing in the main report; all of which are critical to effective plan formulation process and identification of the proper National Economic Development (NED) Plan.

Environmental:

The overall environmental approach was thorough and well stated. The text is clear and sets a good stage for the project justifications and provided the Panel a means to cross check assumptions. The stepwise discussion of the different phases and the determination of the cumulative resultant was a good approach.

Issues found in the EIS included incorrect interpretation of the Environmental Justice Executive Order to include pre-historic Native American residents and their archeological importance. The discussion would have been better covered under the Native American Graves Protection and Repatriation Act (NAGPRA). Additionally, the actual significance of potential remains was not adequately described. Thus, a determination of cumulative significance could not be established.

The impacts to fish and bird species that are not permanent residents need to be placed in the context of when they are present in the project area and what mitigation is planned to avoid impacts during that time. Finally, a more beneficial use for the stripped topsoil from lands considered as farmable should be identified versus returning the topsoil to construct either wetland areas or detention ponds.

TABLE OF CONTENTS

EXECUTIVE SUMMARY	i
1. INTRODUCTION	1
2. PURPOSE OF THE IEPR	2
3. METHODS	2
3.1 Planning and Schedule	2
3.2 Identification and Selection of IEPR Panel Members.....	4
3.3 Preparation of the Charge and Conduct of the IEPR	7
3.4 Review of Individual Comments	8
3.5 IEPR Panel Teleconference.....	8
3.6 Preparation of Final Panel Comments.....	9
4. PANEL DESCRIPTION	10
5. SUMMARY OF FINAL PANEL COMMENTS	16
6. REFERENCES	21
SCHEDULE.....	3
Appendix A	Final Panel Comments on the American River Watershed Common Features Project Natomas Post-Authorization Change Report Main Report
Appendix B	Final Panel Comments on the Draft Environmental Impact Statement/Draft Environmental Impact Report on the American River Watershed Common Features Project Natomas Post-Authorization Change Report Natomas Levee Improvement Program, Phase 4b Landside Improvements Project Appendix A
Appendix C	Final Panel Comments on the American River Watershed Common Features Project Natomas Post -Authorization Change Report Appendix B – Hydrology and Appendix D – Hydraulic Design
Appendix D	Final Panel Comments on the American River Watershed Common Features Project Natomas Post- Authorization Change Report Appendix F – Geotechnical Analysis
Appendix E	Final Panel Comments on the American River Watershed Common Features Project Natomas Post -Authorization Change Report Appendix H – Economics
Appendix F.	Final Charge to the Independent External Peer Review Panel on the Draft Natomas PACR

LIST OF TABLES

Table ES–1.	35 Final Panel Comments Summarized by Document/Discipline and Significance Rating.	iii
Table ES–2.	Overview of 11 Final Comments on the Draft Natomas PACR Main Report Identified by the Natomas PACR IEPR Panel.	iii
Table ES–3.	Overview of 6 Final Comments on Appendix A (DEIS/DEIR) Identified by the Natomas PACR IEPR Panel.	iv

Table ES-4.	Overview of 11 Final Comments on Appendix B (Hydrology) and Appendix D (Hydraulic Design) Identified by the Natomas PACR IEPR Panel.	v
Table ES-5.	Overview of 3 Final Comments on Appendix F (Geotechnical Analysis) Identified by the Natomas PACR IEPR Panel.	v
Table ES-6.	Overview of 4 Final Comments on Appendix H (Economics) Identified by the Natomas PACR IEPR Panel.	vi
Table 1.	Draft Natomas PACR Report IEPR Schedule.....	3
Table 2.	Draft Natomas PACR Review Documents and Charge Question Summary	8
Table 3.	Draft Natomas PACR IEPR Panel: Technical Criteria and Areas of Expertise..	11
Table 4.	35 Final Panel Comments Summarized by Document/Discipline and Significance Rating.	18
Table 5.	Overview of 11 Final Comments on the Draft Natomas PACR Main Report Identified by the Natomas PACR IEPR Panel.	18
Table 6.	Overview of 6 Final Comments on Appendix A (DEIS/DEIR) Identified by the Natomas PACR IEPR Panel.....	19
Table 7.	Overview of 11 Final Comments on Appendix B (Hydrology) and Appendix D (Hydraulic Design) Identified by the Natomas PACR IEPR Panel.	20
Table 8.	Overview of 3 Final Comments on Appendix F (Geotechnical Analysis) Identified by the Natomas PACR IEPR Panel.	21
Table 9.	Overview of 4 Final Comments on Appendix H (Economics) Identified by the Natomas PACR IEPR Panel.....	21

LIST OF ACRONYMS

ATR	Agency Technical Review
ASCE	American Society of Civil Engineers
COI	Conflict of Interest
CVFPB	Central Valley Flood Protection Board
DEIR	Draft Environmental Impact Report
DEIS	Draft Environmental Impact Statement
EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Executive Order
ERDC	Engineer Research and Development Center
FDOT	Florida Department of Transportation
GRR	General Reevaluation Report
HCFCDD	Harris County Flood Control District
H&H	Hydrology and Hydraulics
IEPR	Independent External Peer Review
IGRR	Interim General Reevaluation Report
ITR	Independent Technical Review
LM	Levee Mile
NAGPRA	Native American Graves Protection and Repatriation Act
NCC	Natomas Cross Canal
NED	National Economic Development
NEMDC	Natomas East Main Drain Canal
NEPA	National Environmental Policy Act
NPACR	Natomas Post-Authorization Change Report
NRC	National Research Council
NRHP	National Register of Historic Places
NTP	Notice to Proceed
OMB	Office of Management and Budget
PACR	(Natomas) Post-Authorization Change Report
PGCC	Pleasant Grove Creek Canal
R&U	Risk & Uncertainty
RM	River Mile
SAFCA	Sacramento Area Flood Control Agency
SHPO	State Historic Preservation Officer
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
NEPA	National Environmental Policy Act
PACR	(Natomas) Post-Authorization Change Report

1. INTRODUCTION

The American River Common Features project (Common Features) is being developed to provide flood risk management to the City of Sacramento, California, including the Natomas Basin and areas along the north and south sides of the American River. A fast-growing region in the country's most populous state, the Greater Sacramento area encompasses the floodplains of two major rivers—the Sacramento and the American—as well as additional rivers and tributaries that drain the Sierra Nevada mountains. Expanding urban centers lie in floodplains where flooding could result in extensive loss of life and billions in damages.

Authorized in 1996, the Common Features project consists primarily of levee creation and modification, in addition to flood warning systems and pumping capabilities. However, since authorization, increased understanding of under seepage and through seepage problems that jeopardize levee stability have substantially increased project costs. Consequently, a general engineering and economic reevaluation is necessary to determine if the alternative proposed is still viable and justified and if there is another alternative that may be more effective. The American River Watershed Common Features Project General Reevaluation Report (GRR) includes flood risk management to the City of Sacramento and the Natomas Basin. The purpose of the GRR is to develop analysis tools that consider the flood protection system as a whole and to identify a comprehensive plan that will lower the risk of flooding in and around Sacramento. The objective of this study is to re-evaluate the currently authorized plan, as well as to develop and evaluate other viable alternatives, including a locally-preferred plan.

Having completed the initial increment of the independent external peer review (IEPR) of documentation of the existing geotechnical conditions documentation for the American River Common Features project, the U.S. Army Corps of Engineers (USACE) is conducting an additional IEPR of investigations to analyze the conditions that would result from implementing project alternatives. Recently it has been determined that a “Natomas Post-Authorization Change Report (PACR)” will be prepared in lieu of the Common Features GRR. This decision provides more focused technical investigations that are responsive to the Federal legislative calendar.

The objective of the work described here was to conduct an Independent External Peer Review (IEPR) (also referred to as an optional increment or second work increment) of the Draft Natomas Post-Authorization Change Report (“Draft Natomas PACR”), including select technical appendices. This IEPR was conducted in accordance with procedures described in the Department of the Army, U.S. Army Corps of Engineers Engineer Circular *Civil Works Review Policy* (EC No. 1165-2-209) (USACE, 2010), USACE CECW-CP memorandum *Peer Review Process* (USACE, 2007), and Office of Management and Budget (OMB) bulletin *Final Information Quality Bulletin for Peer Review* (OMB, 2004). Battelle, as a 501(c)(3) non-profit science and technology organization with experience in establishing and administering peer review panels, was engaged to coordinate the IEPR of the Draft Natomas PACR. Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analyses.

This final report details the IEPR process, describes the IEPR panel members and their selection, and summarizes the Final Panel Comments of the IEPR Panel on the existing environmental, economic, and engineering analyses contained in the Draft Natomas PACR documents. Detailed information on the Final Panel Comments is provided in Appendices A through E of this Final IEPR Report.

2. PURPOSE OF THE IEPR

To ensure that USACE documents are supported by the best scientific and technical information, USACE has implemented a peer review process that uses IEPR to complement the Agency Technical Review (ATR), as described in USACE (2010) and USACE (2007).

In general, the purpose of peer review is to strengthen the quality and credibility of the USACE decision documents in support of its Civil Works program. IEPR provides an independent assessment of the economic, engineering, and environmental analysis of the project study. In particular, the IEPR addresses the technical soundness of the project study's assumptions, methods, analyses, and calculations and identifies the need for additional data or analyses to make a good decision regarding implementation of alternatives and recommendations.

In this case, the IEPR of the Draft Natomas PACR was conducted and managed using contract support from Battelle, which is an Outside Eligible Organization under Section 501(c)(3) of the U.S. Internal Revenue Code with experience conducting IEPRs for USACE.

3. METHODS

This section describes the methods followed in selecting the members for the IEPR Panel (the Panel) and in planning and conducting the IEPR. The IEPR was conducted following procedures described by USACE (2010) and in accordance with USACE (2007) and OMB (2004) guidance. Supplemental guidance on evaluation for conflicts of interest was obtained from the *Policy on Committee Composition and Balance and Conflicts of Interest for Committees Used in the Development of Reports* (The National Academies, 2003).

3.1 Planning and Schedule

Having completed the initial increment of the IEPR of documentation of the existing geotechnical conditions documentation for the American River Common Features project, the USACE is conducting an additional optional IEPR increment of investigations to analyze the conditions that would result from implementing project alternatives. After receiving the award modification for the optional increment, Battelle held a kick-off meeting with USACE to review the preliminary/suggested schedule, discuss the IEPR process, and address any questions regarding the scope (e.g., clarify expertise areas needed for the new panel member). Any revisions to the schedule were submitted as part of the final Work Plan.

Table 1 defines the schedule followed in executing the IEPR. Due dates for milestones and deliverables are based on the modification award date of December 18, 2009. Note that the work items listed in Task 8 occur after the submission of this report. Battelle will enter the 35 Final

Panel Comments developed by the Panel into USACE's Design Review and Checking System (DrChecks), a Web-based software system for documenting and sharing comments on reports and design documents, so that USACE can review and respond to them. USACE will provide responses (Evaluator Responses) to the Final Panel Comments, and the Panel will respond (BackCheck Responses) to the Evaluator Responses. All USACE and Panel responses will be documented by Battelle.

Table 1. Draft Natomas PACR Report IEPR Schedule

TASK	ACTION	DUE DATE
1	Award Modification	12/18/2009
	End of Period of Performance	1/29/2011
	*Submit draft Work Plan	3/15/2010
	USACE Provides comments on draft Work Plan	3/26/2010
	Teleconference (if necessary)	3/30/2010
	*Submit final Work Plan	4/8/2010
2	Battelle requests input from USACE on the conflict of interest (COI) questionnaire	3/12/2010
	Battelle recruits and screens potential peer reviewers; prepare summary information	3/18/2010
	*Battelle submits list of selected peer reviewers	3/18/2010
	USACE provides comments on selected peer reviewers	3/22/2010
	Battelle completes subcontracts for peer reviewers	3/29/2010
3	Battelle receives charge from USACE	3/5/2010
	*Battelle submits final charge (combined with Final Work Plan – Task 1)	4/9/2010
	USACE approves final charge	NA
4	Complete subcontracts for peer reviewers	3/29/2010
5	USACE/Battelle Kick-off Meeting	3/19/2010
	USACE/Battelle/Panel Kick-off Meeting	4/6/2010
	USACE/Battelle/National Environmental Policy Act NEPA Impact Assessment panel member on-site kick-off meeting (Sacramento, CA)	3/31/2010
6	Draft Environmental Impact Statement (EIS), Geotechnical, and Hydrology and Hydraulics (H&H) Review Documents provided to Panel reviewers	4/5/2010
	External peer reviewers Panel members complete their review (Draft EIS, Geotechnical, H&H)	4/28/2010
	Economics Review documents sent to peer Panel	4/28/2010
	External peer reviewers Panel members complete their review (Economics)	5/19/2010
	Draft NPAC Main Report sent to peer Panel	6/11/2010
	External peer reviewers Panel members complete their review (Draft Natomas PACR Main Report)	7/2/2010
7	Convene panel review teleconference (H&H)	5/18/2010
	Convene panel review teleconference (Draft EIS)	5/21/2010
	Convene panel review teleconference (Geotechnical)	5/19/2010
	Convene panel review teleconference (Economics)	6/15/2010
	Convene panel review teleconference (Natomas PACR Main Report)	7/8/2010
	External peer reviewers Panel provides Final Panel Comments to Battelle	8/2/2010
	*Battelle submits Final IEPR Report	9/7/10

TASK	ACTION	DUE DATE
7	*Battelle submits Revised Final IEPR Report	9/16/10
8	Battelle inputs Final Panel Comments to DrChecks	TBD
	USACE PDT provides draft Evaluator Responses and clarifying questions to Battelle	TBD
	Final Panel Comment Teleconference between Battelle, Panel team, and PDT USACE to discuss Final Panel Comments, draft responses and clarifying questions	9/8/10
	USACE inputs final Evaluator Responses in DrChecks	TBD
	Battelle inputs BackCheck Responses in DrChecks	TBD
	*Battelle submits pdf printout of DrChecks project file	TBD
	Project Closeout	10/18/2010

TBD: To be determined

(*) Asterisks indicate deliverables

3.2 Identification and Selection of IEPR Panel Members

The candidates for the Panel were evaluated based on their technical expertise in the following key areas: geotechnical engineering, hydraulic engineering, economics, and National Environmental Policy Act (NEPA) impact assessment. It was also emphasized that the geotechnical peer reviewers (three in total) should be familiar with geotechnical engineering practices used in California, and that all reviewers be active in their related professional societies. These areas correspond to the technical content of the Draft Natomas PACR and overall scope of the Draft Natomas PACR project.

To identify candidate panel members, Battelle reviewed experts in Battelle's Peer Reviewer Database, sought recommendations from colleagues, contacted former panel members, and conducted targeted Internet searches. For the initial work increment, Battelle initially identified approximately 20 candidates for the Common Features GRR IEPR Panel, evaluated their technical expertise, and inquired about potential conflicts of interest. Of these, Battelle chose eight of the most qualified candidates and confirmed their interest and availability. Of the eight candidates, five were proposed for the final Panel and three were proposed as backup reviewers. These same panel members were reengaged for the second work increment for the IEPR of the Draft Natomas PACR IEPR.

For the second work increment, one additional panel member with expertise in NEPA impact assessment was recruited to be on the Panel. Battelle initially identified seven candidates, evaluated their technical expertise, and inquired about potential conflicts of interest. Of these, Battelle chose two of the most qualified candidates and confirmed their interest and availability. Of the two NEPA impact assessment candidates, one was proposed for the final Panel and one was proposed as a backup reviewer. Information about the candidate panel member, including brief biographical information, highest level of education attained, and years of experience, was provided to USACE for feedback. Battelle made the final selection of panel members according to the selection criteria described in the Work Plan.

The six proposed primary reviewers constituted the final Panel. The remaining candidates were not proposed for a variety of reasons, including lack of availability, disclosed conflicts of interest, or lack of the precise technical expertise required.

The candidates were screened for the following potential exclusion criteria or conflicts of interest.¹ These COI questions were intended to serve as a means of disclosure, and to better characterize a potential candidate's employment history and background. Providing a positive response to a COI screening question did not automatically preclude a candidate from serving on the Panel. For example, participation in previous USACE technical peer review committees and other technical review panel experience was included as a COI screening question. A positive response to this question could be considered a benefit.

- Involvement by you or your firm² in any part of the American River Common Features Project, including but not limited to producing the Common Features General Reevaluation Report, Natomas Post-Authorization Change Report, Environmental Impact Statement, supporting appendices, related technical data, and models pertaining to the Report.
- Current employment by the USACE.
- Current or previous employee or affiliation with other project sponsors, including the State of California Central Valley Flood Protection Board (CVFPB - formerly known as The Reclamation Board) and the Sacramento Area Flood Control Agency (SAFCA).
- Current or future interests in the subject project or future benefits from the project.
- Current personal or firm² involvement with other USACE projects, notably if those projects/contracts are with the Sacramento District or South Pacific Division. If yes, provide title/description, dates, and location (USACE district, division, Headquarters, ERDC, etc.), and position/role.
- Previous employment by the USACE as a direct employee or contractor (either as an individual or through your firm²) within the last 10 years, notably if those projects/contracts are with the Sacramento District or South Pacific Division. If yes, provide title/description, dates employed, and place of employment (district, division, Headquarters, ERDC, etc.), and position/role.
- Previous experience conducting technical peer reviews. If yes, provide client/agency and duration of review (approximate dates).
- A significant portion (i.e., greater than 50%) of personal or firm² revenues within the last 3 years came from USACE contracts.
- Any publicly documented statement made advocating for or against the subject project.

¹ Battelle evaluated whether scientists in universities and consulting firms that are receiving USACE-funding have sufficient independence from USACE to be appropriate peer reviewers. See OMB (2004, p. 18), "...when a scientist is awarded a government research grant through an investigator-initiated, peer-reviewed competition, there generally should be no question as to that scientist's ability to offer independent scientific advice to the agency on other projects. This contrasts, for example, to a situation in which a scientist has a consulting or contractual arrangement with the agency or office sponsoring a peer review. Likewise, when the agency and a researcher work together (e.g., through a cooperative agreement) to design or implement a study, there is less independence from the agency. Furthermore, if a scientist has repeatedly served as a reviewer for the same agency, some may question whether that scientist is sufficiently independent from the agency to be employed as a peer reviewer on agency-sponsored projects."

² Includes any joint ventures in which your firm is involved.

- Any other perceived COI not listed, such as:
 - Repeatedly served as USACE technical reviewer
 - Paid or unpaid participation in litigation related to the work of the USACE
 - Any other perceived COI not listed
- Participation in relevant prior studies discussed in the detailed project history:
 - American River Watershed Investigation, California, Feasibility Report, December 1991.
 - American River Watershed Investigation, California, Chief of Engineers' report, dated 29 June 1992.
 - American River Watershed Project, California, Supplemental Information Report, March 1996.
 - American River Watershed, California, Chief of Engineers' Report dated 27 June 1996.
 - Supplemental Information Report, American River Watershed Project, California, Main Report and SEIS/EIR Addendum, 18 August 1997.
 - Project Cooperation Agreement between the Department of the Army and the State of California for Construction of the American River Watershed (Common Features), California Project, 13 July 1998.
 - American River Watershed Project, California (Common Features), Information Paper, 16 August 2000.
 - American River Watershed Project (Common Features), California, Second Addendum to the Supplemental Information Report, March 2002.
 - American River (Common Features) Project, California, Project Cooperation Agreement (Contract 460000065 I), Amendment No. 1, 13 June 2003.
 - Memorandum, CESPK-PM-C, Subject: American River Watershed (Common Features), California Project, Pocket and Pioneer Reservoir Levee Improvement Areas- Information Paper, 07 April 2007.
 - Memorandum for Record, CESPK-OC, Inclusion of Levee Repair within the Sacramento Pocket and Pioneer Sites under the American River CF Project, 17 April 2006.
 - American River Watershed Project, Folsom Modification and Folsom Dam Raise Post-Authorization Report and Engineering Documentation Report, March 2007.
 - American River Watershed Project, Folsom Modification and Folsom Dam Raise Economic Reevaluation Report, Draft June 2007.
- Participation in major flood risk management initiatives active in Northern California and in the Sacramento Watershed: (All of these efforts are directly influencing the Common Features Project.)
 - American River Watershed Program
 - Delta CALFED Program
 - Sacramento River Flood Control Project
 - Sacramento River Bank Protection Project
 - Sacramento and San Joaquin River Basins Comprehensive Study
 - FloodSAFE California
 - SAFCA Development Impact Fee
 - SAFCA Natomas Levee Improvement Project

- Central Valley Flood Protection Plan
- California's Public Law 84-99 Eligibility Retention and Flood System Improvement Framework

In selecting the final members of the Panel from the list of candidates, Battelle chose experts who best fit the expertise areas and had no conflicts of interest. The six final reviewers were either affiliated with academic institutions or consulting companies or were independent engineering consultants. Battelle established subcontracts with the panel members when they indicated their willingness to participate and confirmed the absence of conflicts of interest through a signed Conflict of Interest form. Although the Panel was disclosed to USACE, Battelle made the final decision on selecting the Panel. Section 4 of this report provides names and biographical information on the panel members.

Prior to beginning the review and within 2 days of the subcontract being finalized, the new NEPA impact assessment panel member attended an onsite site visit and kick-off meeting in Sacramento, planned and facilitated by Battelle in order to view the project area, review the IEPR process, the schedule, communication, and other pertinent information. The five panel members who participated in the initial IEPR increment had previously attended an onsite site visit and kick-off meeting in Sacramento during the initial work increment.

3.3 Preparation of the Charge and Conduct of the IEPR

USACE provided Battelle specific charge questions and discussion points that were to guide the peer review, prepared according to guidance provided in USACE (2010) and OMB (2004). The draft charge was submitted to the USACE as part of the draft Work Plan and was later used to produce the final charge. The final charge was submitted to USACE for approval. In addition to a list of 119 charge questions/discussion points, the final charge included general guidance for the Panel on the conduct of the peer review (provided in Appendix F of this Final IEPR Report).

Battelle planned and facilitated a final kick-off meeting via teleconference with the Panel, during which Battelle presented project details and a refresher on the IEPR process to the panel members who were reengaged for the second work increment, along with the new NEPA impact assessment panel member. Before the meeting, the IEPR Panel received an electronic version of the technical appendix they were assigned to review and the final charge. A full list of the documents reviewed by the Panel is provided in Appendix F of this report. The Panel was instructed to address the charge questions/discussion points within a comment-response form provided by Battelle.

Table 2. Draft Natomas PACR Review Documents and Charge Question Summary

Document/Discipline	No. of Charge Questions	Panel Members Tasked with Review	Total No. of Comments Received
Draft Natomas PACR Main Report	21	6	126
Appendix A – Draft Environmental Impact Statement and Appendices	35	1	49
Appendix B Hydrology and Appendix D Hydraulic Design	18	1	24
Appendix F – Geotechnical Analysis	28	3	84
Appendix H – Economics	17	1	17
Total	119		300

3.4 Review of Individual Comments

The Panel produced approximately 300 individual comments in response to the charge questions/discussion points. Battelle reviewed the comments to identify overall recurring themes, areas of potential conflict, and other overall impressions. As a result of the review, Battelle was able to summarize the 300 comments into a preliminary list of 55 overall comments and discussion points. Each panel member's individual comments were shared with the full Panel in a merged individual comments table.

For the Draft Natomas PACR main report, the individual comments from all six IEPR panel members were merged. For the Appendix F (Geotechnical Analysis) documents, the individual comments from all six IEPR panel members and the individual comments from the three geotechnical peer reviewers, respectively, were merged. For the individual reviews of the Draft Natomas PACR Appendix A, B, and H documents, only one panel member was tasked with the review and thus, no comments were merged.

3.5 IEPR Panel Teleconference

Battelle facilitated teleconference discussions with the IEPR Panel to allow the exchange of technical information among the panel experts, many of whom are from diverse scientific backgrounds. The main goal of the teleconferences was to identify which issues should be carried forward as Final Panel Comments in the IEPR Report and decide which panel member would serve as the lead author for the development of each Final Panel Comment. This information exchange ensured that the Final IEPR Report would accurately represent the Panel's assessment of the project, including any conflicting opinions. Five panel teleconferences were conducted. Panel members participated in one panel teleconference to their discipline/technical appendix reviewed (four teleconferences in all: geotechnical engineering, hydraulic engineering, economics, and NEPA impact assessment) and one teleconference with all six panel members to discuss the Draft Natomas PACR main report. Each panel review teleconference consisted of a thorough discussion of the overall positive and negative comments, added any missing issues of high-level importance to the findings, and merged any related individual comments. In addition, Battelle confirmed each Final Panel Comment's level of significance to the Panel.

During the panel teleconference that discussed the Draft Natomas PACR main report, the Panel also discussed responses to six specific charge questions where there appeared to be

disagreement among panel members. The conflicting comments were resolved based on the professional judgment of the Panel, and all sets of comments were determined not to be conflicting. Each comment was either incorporated into a Final Panel Comment, determined to be consistent with other Final Panel Comments already developed, or determined to be a non-significant issue.

At the end of these discussions, the Panel identified 34 comments and discussion points that should be brought forward as Final Panel Comments.

3.6 Preparation of Final Panel Comments

Following each teleconference, Battelle prepared for the Panel a summary memorandum documenting each Final Panel Comment (organized by level of significance). The memorandum provided the following detailed guidance on the approach and format to be used to develop the Final Panel Comments for the Draft Natomas PACR:

- **Lead Responsibility:** For each Final Panel Comment, one Panel member was identified as the lead author responsible for coordinating the development of the Final Panel Comment and submitting it to Battelle. Battelle modified lead assignments at the direction of the Panel. To assist each lead in the development of the Final Panel Comments, Battelle distributed merged individual comments in the comment-response form table, a summary detailing each draft final comment statement, an example Final Panel Comment following the four-part structure described below, and a template for the preparation of the Final Panel Comments.
- **Directive to the Lead:** Each lead was encouraged to communicate directly with other IEPR panel members as needed and to contribute to a particular Final Panel Comment. If a significant comment was identified that was not covered by one of the original Final Panel Comments, the appropriate lead was instructed to draft a new Final Panel Comment.
- **Format for Final Comments:** Each Final Panel Comment was presented as part of a four-part structure:
 1. Comment Statement (succinct summary statement of concern)
 2. Basis for Comment (details regarding the concern)
 3. Significance (high, medium, low; see description below)
 4. Recommendation for Resolution (see description below).
- **Criteria for Significance:** The following were used as criteria for assigning a significance level to each Final Panel Comment:
 1. High: Describes a fundamental problem with the project that could affect the recommendation or justification of the project
 2. Medium: Affects the completeness or understanding of the reports/project
 3. Low: Affects the technical quality of the reports but will not affect the recommendation of the project.
- **Guidance for Developing the Recommendation:** The recommendation was to include specific actions that the USACE should consider to resolve the Final Panel Comment

(e.g., suggestions on how and where to incorporate data into the analysis, how and where to address insufficiencies, areas where additional documentation is needed).

At the end of this process, 35 Final Panel Comments were prepared and assembled, as one additional Final Panel Comment was prepared as a result of the public comments. Battelle reviewed and edited the Final Panel Comments for clarity, consistency with the comment statement, and adherence to guidance on the Panel's overall charge, which included ensuring that there were no comments regarding either the appropriateness of the selected alternative or USACE policy. There was no direct communication between the Panel and USACE during the preparation of the Final Panel Comments. The Final Panel Comments are presented in Appendices A through E of this report.

4. PANEL DESCRIPTION

Candidates for the Panel were identified using Battelle's Peer Reviewer Database, targeted Internet searches using key words (e.g., technical area, geographic region), searches of websites of universities or other compiled expert sites, and referrals. Battelle prepared a draft list of primary and backup candidate panel members (which were screened for availability, technical background, and conflicts of interest), and provided it to USACE for feedback. Battelle made the final selection of panel members.

An overview of the credentials of the final six members of the Panel and their qualifications in relation to the technical evaluation criteria is presented in Table 3. More detailed biographical information regarding each panel member and his or her area of technical expertise is presented in the text that follows the table.

Table 3. Draft Natomas PACR IEPR Panel: Technical Criteria and Areas of Expertise

Technical Criteria/ Primary Areas of Expertise	Nicholson	Baecher	Rudolph	Yung	Kelsoe	Looney
General Expertise						
Registered professional with 10 years experience (e.g., PE or other)	X	X	X	X	X	X
Ph.D.	X	X				
Active participation in related professional societies	X	X	X	X	X	X
All Geotechnical Panel Members						
Experience in geotechnical studies and design of flood control works such as dams, levees, floodwalls, and closure structures.	X	X	X			
Familiar with geotechnical practices used in California	X	X	X			
General Geotechnical Expertise						
Site investigation and planning and implementation including:	X	X	X			
Subsoil investigation	X	X	X			
In situ soil testing	X		X			
State of the art static and dynamic laboratory testing on disturbed and undisturbed soil samples	X	X	X			
Evaluation of flood control structures such as static and dynamic slope stability evaluation	X	X	X			
Evaluation of seepage through earthen embankments and underseepage through the foundation of the flood control structures, including, dam and levee embankments, floodwalls, and closure structures	X	X	X			
Settlement evaluation of flood control structures	X	X	X			
Design and remediation of flood control structures and foundations, including foundation soil improvement, such cut-off walls and grouting practice	X	X	X			
Geotechnical Risk Analysis						
Geotechnical risk analysis		X				
Application of probabilistic methods to geotechnical aspects of flood damage reduction planning studies		X				

Geotechnical Seismic Analysis						
Liquefaction evaluations of sites and earth structures, particularly flood control structures	X		X			
Hydraulic Engineer						
Large public works projects				X		
Extensive background in hydraulic theory and practice				X		
Familiar with USACE application of risk and uncertainty analysis in flood damage reduction studies				X		
Familiar with standard USACE hydrologic and hydraulic computer models				X		
Economics						
Water resource economic evaluation or review					X	
Experience directly working for or with USACE					X	
Experience with the Hydrologic Engineering Center Flood Damage Analysis (HEC-FDA) software developed by the USACE.					X	
Experience in reviewing federal water resource economic documents justifying construction efforts.					X	
NEPA Impact Assessment						
Experience in evaluating and conducting NEPA impact assessments						X
Conducting cumulative effects analyses						X
Experience with complex multi-objective public works projects with competing trade-offs						X
Experience determining the scope and appropriate methodologies for impact assessment and analyses for a variety of projects and programs with high public and interagency interests						X
Experience determining the scope and appropriate methodologies for impact assessment and analyses for projects and programs having impacts to nearby sensitive habitats						X
Active participation in related professional societies						X

Gregory Baecher, Ph.D.

Role: This reviewer was chosen primarily for his expertise in the area of geotechnical risk analysis.

Affiliation: University of Maryland

Greg Baecher is the Glenn L. Martin Institute Professor of Engineering at the University of Maryland. He holds a B.S., Civil Engineering, from the University of California Berkeley, and Sc.M. and Ph.D. degrees from Massachusetts Institute of Technology. Dr. Baecher is a geotechnical engineer by training, but has spent much of his career as an active consultant to government and industry on risk and reliability of constructed facilities, especially in water resources development, dam safety, and national security. His areas of expertise include water resources engineering and policy, risk and safety analysis, flood risk management, environmental impacts of dams and water projects, natural hazards, and infrastructure security. He has served as a peer reviewer for the Sabine-Neches Waterway (SNWW) Channel Improvement Plan (CIP) Draft Feasibility Report, Draft Environmental Impact Statement, and Supporting Documentation. Dr. Baecher is a member of the National Academy of Engineering, has authored several National Research Council (NRC) reports pertaining to risk analysis and water resource policy, has served on numerous NRC committees, and is currently the Chairman of the NRC's Committee on Geotechnical and Geological Engineering. He is co-author with J. T. Christian of *Reliability and Statistics in Geotechnical Engineering* (Wiley 2003), with D.N.D. Hartford of *Risk and Uncertainty in Dam Safety* (Thos. Telford 2004), with K. Frolov of *Protection of Civil Infrastructure from Acts of Terrorism* (Springer 2006), and with P. A. Zielinski and D.N.D. Hartford of the forthcoming *Risk Evaluation in Dam Safety* (Thos. Telford forthcoming). Dr. Baecher is recipient of the American Society of Civil Engineers (ASCE) Middlebrooks and State-of-the-Art Awards, and was elected to the U.S. National Academy of Engineering in 2006.

Darrell J. Kelsoe

Role: This reviewer was chosen primarily for his expertise in the area of economics.

Affiliation: Brown and Gay Engineers, Inc.

Darrell Kelsoe serves as Manager of the Economics Division with Brown and Gay Engineers, Inc., and has over 25 years of professional experience in economics and financial models. He has extensive experience in flood damage reduction projects with the USACE, including acting as the lead economist for the White Oak Bayou, Brays Bayou, Buffalo Bayou, and Halls Bayou Flood Damage Reduction Projects. He has a working knowledge of the USACE planning process relative to the USACE Principles and Guidelines and the federal objective related to water land resources projects. His technical expertise includes six6 years of risk-based analysis using the HEC-FDA modeling program, financial analysis, appraisals, land use analysis, and social impacts. He has computed inundation benefits, location benefits, and recreation benefits for urban flood damage reduction projects. For the White Oak Bayou Flood Damage Reduction Study, Mr. Kelsoe prepared the structure inventory for over 25,000 residential and nonresidential structures and utilized the HEC-FDA program to perform risk-based analysis. Additionally, he was the principal economist for the Dallas Floodway Extension Feasibility Study, for which he performed a statistical analysis to validate the use of Dallas Central Appraisal District as a secondary data source as well as assisted in the development of depth-damage curves for large commercial structures.

Peter Nicholson, PhD., P.E.

Role: This reviewer was chosen primarily for his expertise in the area of general geotechnical engineering.

Affiliation: University of Hawaii at Manoa

Peter Nicholson currently serves as a professor and graduate chair for the Department of Civil and Environmental Engineering at the University of Hawaii at Manoa, where he has been the senior faculty member for the geotechnical program for 17 years. Dr. Nicholson is in charge of the geotechnical testing laboratories; conducting research in the areas of advanced laboratory soils testing, dynamic liquefaction, and dynamic soil failures. He also provides consulting services for various geotechnical/civil engineering firms and government agencies on earth structures, slope stability and seepage analysis problems including static and dynamic soil testing, static and dynamic stability analyses, liquefaction evaluations of sites and earth structures, state-of-the-art laboratory testing and analyses of soil samples, design of field instrumentation for embankments, dams and reservoirs, site investigation planning and implementation, dam safety and levee evaluations, and remedial geotechnical recommendations. Under previous employment at a firm in California, he conducted field engineering, site inspections, static and dynamic analyses of dams and levees, remedial designs for foundations and earth structures, slope and embankment design, and design and implementation of automated field monitoring techniques. Dr. Nicholson served as the team leader for the ASCE Levee Assessment Team deployed to New Orleans in the aftermath of Hurricanes Katrina and Rita. He is the immediate past chair of the Embankment, Dams & Slopes Committee for the American Society of Civil Engineers (ASCE) Geo-Institute and has been an active member of the Association of State Dam Safety Officials (ASDSO). Dr. Nicholson holds M.S. and Ph.D. degrees in civil/geotechnical engineering from Stanford University. He is a licensed Professional Engineer in Hawaii, with more than 20 years' experience in design, inspection, and assessment of dams and levees in Utah, California, and Hawaii.

R. William Rudolph, P.E., G.E.

Role: This reviewer was chosen primarily for his expertise in the area of geotechnical seismic analysis.

Affiliation: Independent Consultant

Bill Rudolph has been serving as Principal Engineer and Project Manager on a wide variety of geotechnical engineering projects throughout California and the West for the past 30 years. He specializes in port and harbor facilities; flood control; earth-fill dams and levees; water resources; dredging and environmental restoration projects; and mass transit, bridge, and highway improvements. Mr. Rudolph has provided consulting services to more than 150 small, earth-fill dams and reservoirs, including site selection, geologic and seismic assessment, material sources and design alternatives, and supervised the construction management of many of these projects. His relevant experience includes providing engineering analysis of side slope stability (static and seismic), seismic-induced slope deformation, liquefaction, long-term dewatering, and subsurface drainage for a flood control detention basin. He has also conducted a geotechnical investigation and design of a regional dredge disposal facility. Investigation included extensive in-situ testing supplemented by laboratory testing, in accordance with Federal Emergency Management Agency and USACE guidelines. He also managed a probabilistic seismic hazard assessment of levee stability. For a harbor in California, Mr. Rudolph is evaluating the static and

seismic waterfront slope stability and is assessing the liquefaction potential, including estimates of liquefaction-induced settlement. He is a member of ASCE and the Association of Soil and Foundation Engineers. He continues to be involved with the Oakland International Airport levee project on the seismic stabilization of the airport levee, including the use of ground improvement for levee strengthening and liquefaction mitigation.

Andrew C. Yung, P.E

Role: This reviewer was chosen primarily for his expertise in the area of hydraulic engineering.

Affiliation: Dodson & Associates, Inc.

Andy Yung is the Chief Hydrologist and a Vice President of Dodson & Associates, Inc. He has over 22 years of experience as an engineer, planner, and hydrologist, and holds a Bachelor of Civil Engineering degree, from Georgia Tech. In his 14 years with Dodson, Mr. Yung has managed a wide range of engineering projects involving hydrology, hydraulics, master drainage studies, channel modification and hydraulic structure designs, watershed impact analyses, detention facility designs, and dam safety analyses. He has also served as the team leader for the Independent Technical Review (ITR) of several federal flood damage reduction studies currently under way in Houston, Texas. These studies were authorized under Section 211(f) of the 1996 Water Resources Development Act. Mr. Yung personally reviewed the Hydrology & Hydraulics and Alternative Formulation as part of the ITR for these locally initiated federal flood control studies on Brays Bayou, Hunting Bayou, and White Oak Bayou, and has also provided review and support services on the Buffalo Bayou and Halls Bayou federal projects. He is very familiar with HEC-HMS, HEC-RAS, HEC-DSS, and HEC-SSP. Prior to joining Dodson, Mr. Yung was employed as a Senior Engineer with the Harris County Flood Control District (HCFCD), Planning Department in Houston, Texas and served as the HCFCD's Project Manager for the USACE federal flood damage reduction study on Cypress Creek. For a previous employer, Mr. Yung provided engineering design support for numerous public and private water resource/stormwater facilities and provided review support for the National Flood Insurance Program. In addition to flood risk assessment projects, Mr. Yung inspected the Grant Lake and Lake Wilderness dams for state and federal safety requirements and provided predictive tools for the HCFCD for real-time flood prediction. Mr. Yung is a licensed Professional Engineer in the states of Texas, Georgia, and Louisiana, a national Certified Floodplain Manager, and a member of the Association of State Flood Plain Managers, Texas Floodplain Managers Association, and the Association of State Dam Safety Officials.

Paul Looney, M.S.

Role: This reviewer was chosen primarily for his expertise in the area of NEPA impact assessment.

Affiliation: Volkert Environmental Group, Inc.

Mr. Paul Looney has an M.S. in coastal zone studies and biology and 27 years of professional experience, including nearly 20 years as an ecologist. He is currently a certified senior ecologist and senior project manager with Volkert Environmental Group, Inc., in Mobile, AL. Mr. Looney's master's research examined the environmental impacts related to deposition of dredge material in a coastal environment. He has performed National Environmental Policy Act (NEPA) impact assessments of natural resources associated with five Environmental Impact Statements (EIS) and eight environmental assessment (EA) projects. Impact analysis experience

includes wetland delineations and evaluations, threatened and endangered species surveys, Essential Fish Habitat assessments, coastal zone management investigations, Endangered Species Act Section 7 biological assessments, and contamination determinations. His NEPA experience includes cumulative effects analyses for a range of environmental topics. His experience with large public works projects has included being the project biologist for the EIS analysis of the proposed alternative alignments for the Mobile River Bridge project across Mobile Bay (part of the I-10 corridor). He was responsible for natural resource impact surveys to nearby wetlands and to threatened and endangered species. He was in charge of all NEPA documentation for a Florida Department of Transportation (FDOT) traffic flow improvement project in Panama City. In another FDOT project with extensive interagency coordination, had Mr. Looney had responsibility for all NEPA-related aspects of improvements to a critically eroding state roadway, which was in an environmentally sensitive area and which provided the only means of evacuation for St. Joseph's Peninsula in Gulf County, FL. He is the Vice President of the National Association of Environmental Professionals.

5. SUMMARY OF FINAL PANEL COMMENTS

The IEPR panel members generally agreed on their “assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used” (USACE, 2010; p. D-4) in the Draft NPAC Report and Interim General Reevaluation Report and related appendices. The American River Watershed Common Features Project for the Natomas Basin is an extensive and complex undertaking. The phased approach to implementation of this project and the research that have gone into the various stages of the overall project are well documented, as was the historical background for the current project, including earlier flood events, changes in hydrologic conditions, and land use. The discussion of the purpose and need, project scope, goals, and objectives were clearly outlined and described. While the report appears to be technically sound, the Panel would like to see additional clarity regarding plan formulation so that the technical detail supports the need for the overall project.

Economics:

The documents reviewed provide good background information regarding the Natomas Basin including the Economic Impact Area, field inventory characteristics, and value of damageable properties by structure type. The report also provided a detailed explanation of the economic methodology, which included identifying nonstructural and structural alternatives, an incremental analysis to optimize the measures, and a thorough and logical plan formulation.

The documents reviewed need clarification regarding the assumptions used in the Without Project Conditions, a Last Added analysis and an analysis regarding the overall flood risk management system and how the Natomas Basin is affected.

Engineering:

This report was well organized and easy to understand. The geotechnical discussions and conclusions present in the report are based on extensive geotechnical explorations and comprehensive analysis. The proposed remediation measures are well supported by the analysis and seem effective, reasonable, logical, and well organized. However, the Panel suggests minor improvements to the presentation of the geotechnical aspects of the project by including

the labeling of levee miles on the figures to permit the reader to better understand the areas being discussed and by better referencing of the geotechnical appendices within the main report. The fragility curves used in the Risk and Uncertainty analysis needed to be better correlated. There also could have been a better incorporation of the historic flood levels to the probability of failure analysis.

On the whole, the Hydrology and Hydraulic Engineering documents in the Natomas Post Authorization Change Report did an excellent job of anticipating comments based on previous panel review of the American River Common Features General Reevaluation Report, and they provide a good base from which to build the project and begin building the alternative formulation. The methods, models, and analyses appear to be appropriate and acceptable with respect to the engineering aspects of the project. For example, the overall layout and presentation of the document is generally systematic in its approach and flows fairly well.

However, the documents still need some clarity to adequately describe the interaction between the HEC-RAS and FLO-2D models to produce frequency-damage relationships for use in the economic analyses given the difference in datums. Other critical issues relate to the description of the “with project” conditions and the derivation of stage frequency relationships in the H&H appendices, and documentation of the plan formulation sequencing in the main report; all of which are critical to effective plan formulation process and identification of the proper NED Plan.

Environmental:

The overall environmental approach was thorough and well stated. The text is clear and sets a good stage for the project justifications and provided the Panel a means to cross check assumptions. The stepwise discussion of the different phases and the determination of the cumulative resultant was a good approach.

Issues found in the EIS included incorrect interpretation of the Environmental Justice Executive Order to include pre-historic Native American residents and their archeological importance. The discussion would have been better covered under the Native American Graves Protection and Repatriation Act (NAGPRA). Additionally, the actual significance of potential remains was not adequately described. Thus, a determination of cumulative significance could not be established.

The impacts to fish and bird species that are not permanent residents need to be placed in the context of when they are present in the project area and what mitigation is planned to avoid impacts during that time. Finally, a more beneficial use for the stripped topsoil from lands considered as farmable should be identified versus returning the topsoil to construct either wetland areas or detention ponds.

Tables 4 - 9 list the 35 Final Panel Comment statements by level of significance, and are discussed in more detail in Appendices A through E of this report.

Table 4. 35 Final Panel Comments Summarized by Document/Discipline and Significance Rating.

Document/Discipline	IEPR Report Appendix ^(a)	Panel Members Tasked with Review	Total No. of Final Comments	No. of Comments by Significance Rating		
				High	Medium	Low
Draft Natomas PACR Main Report	A	6	11	4	5	2
Appendix A – Draft Environmental Impact Statement/Draft Environmental Impact Report (DEIS/DEIR)	B	1	6	1	2	3
Appendix B Hydrology and Appendix D Hydraulic Design	C	1	11	0	2	9
Appendix F – Geotechnical Analysis	D	3	3	0	3	0
Appendix H – Economics	E	1	4	1	3	0
Total			35	6	15	14

^(a)Full Final Panel Comment provided in Appendices A through E of this report.

Table 5. Overview of 11 Final Comments on the Draft Natomas PACR Main Report Identified by the Natomas PACR IEPR Panel.

Significance – High	
A01	The sequence of the plan formulation process appears to be incomplete and is hard to follow; therefore, it is difficult to determine whether the National Economic Development (NED) Plan has been correctly identified.
A02	The discussion of induced development as it relates to Executive Order 11988 requires clarification.
A03	The assumptions that underlie the economic analysis need to address the discrepancy in the Without-Project Conditions that might affect plan formulation.
A04	The Post-Authorization Change Report (PACR) does not explain the alternative for the closing of the Sankey Road Gap.
Significance – Medium	
A05	The most recent version of the report should reference the Environmental Impact Statement (EIS) as a report Appendix for the overall project.
A06	A conclusion or analysis on how past and current related studies or projects affect the Natomas Basin or how the proposed plan affects the overall flood risk management system needs to be included.
A07	The technical considerations contained in the rationale for eliminating certain alternatives should be further developed and results of evaluations documented.
A08	The non-structural measure of buyouts/permanent relocations needs to be addressed in the main report.
A09	Public comments on the Natomas PACR need to be addressed in the report.

Significance – Low	
A10	The Post-Authorization Change Report (PACR)/Interim General Reevaluation Report (IGRR) could be improved by referencing the report appendices, thereby directing the reader to more in-depth discussion of the technical details which form the basis of the conclusions.
A11	Minor suggested changes to the document are recommended to improve the readability and understanding of the report.

Table 6. Overview of 6 Final Comments on Appendix A (DEIS/DEIR) Identified by the Natomas PACR IEPR Panel.

Significance – High	
B01	Prehistoric Native American residents of the project area are not covered by Executive Order 12898 (Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations) and should be discussed separately.
Significance – Medium	
B02	Construction timing related to the presence of Swainson's Hawk and the anadromous fish species should be clarified as to the potential for impacts to those species.
B03	The likelihood of Native American remains in the project area is not well documented and the interpretation of such remains as a significant effect warrants further justification.
Significance – Low	
B04	The overall readability of the document could be improved by incorporating additional details and some reorganization to the plate illustrations.
B05	The final use for topsoil that has been stripped from farmable land areas should be reconsidered for locations where the borrow area will be transformed as detention ponds or managed wetlands.
B06	The discussion of Impacts to Fish and Aquatic Habitats is not well constructed and not thoroughly supported.

Table 7. Overview of 11 Final Comments on Appendix B (Hydrology) and Appendix D (Hydraulic Design) Identified by the Natomas PACR IEPR Panel.

Significance – Medium	
C01	The assumption of “no hydraulic impacts” is unclear and may not be appropriate under the With-Project Condition.
C02	The assumption of stage-frequency relationships for reaches F, G, and H as described in the first paragraph of Section 4.1 in Appendix D is not well supported by Figure 2-14.
Significance – Low	
C03	The approach for generating peak flow frequency curves for Dry and Arcade Creeks should be clarified by providing the relationship for the development of peak flows, and a statement discussing the amount of floodplain storage being utilized in the routing of flood flows.
C04	A clarification of the higher FLO-2D water surface elevation relative to the HEC-RAS water surface at the upstream end of Figure 1-8 needs to be provided.
C05	The location of the storage areas in relation to cross section locations in the HEC-RAS model is unclear.
C06	Method 2 of the procedure for the downstream boundary condition requires some additional clarification to be differentiated from Method 1.
C07	The effect of the datum differences on frequency-damage curves for the Natomas Basin needs additional clarification.
C08	The discussion of hydraulic uncertainty in Section 4.2.1 requires clarification.
C09	Figures 2-14, 2-17, and 2-20 should label the pump station location along the profile to avoid confusion.
C10	The adjustment to the 2-year stages provided in Section 4.1 need additional details.
C11	It is unclear whether the discussion of the backwater effects on levee breaches in the HEC-RAS model pertains to tailwater on the other side of the breach, or backwater from another flooding source.

Table 8. Overview of 3 Final Comments on Appendix F (Geotechnical Analysis) Identified by the Natomas PACR IEPR Panel.

Significance – Medium	
D01	Document readability and clarity of Appendix F would be improved by including an additional figure at the beginning of the document labeling levee miles within each reach.
D02	Document readability and clarity could be improved by showing Without-Project and With-Project combined fragility curves.
D03	A validation of historical experience of flood height and levee performance should be provided to support the fragility curve for levee failure, which seems high for some reaches.

Table 9. Overview of 4 Final Comments on Appendix H (Economics) Identified by the Natomas PACR IEPR Panel.

Significance – High	
E01	The incremental analysis floodplain assignments (i.e., water surface profiles) used to perform the increments, or order of fixes, is unclear.
Significance – Medium	
E02	The technical soundness and clarity of the incremental benefit analysis could be improved by performing a “Last Added” increment as a separate action.
E03	A detailed narrative on the major economic assumptions is provided, but does not address the likelihood that the proposed modifications assumed for the NA3 condition will occur.
E04	The sensitivity analysis that was performed on the Without-Project damages and With-Project benefits is well supported and documented but needs to be clarified.

6. REFERENCES

OMB (2004). Final Information Quality Bulletin for Peer Review. Executive Office of the President, Office of Management and Budget, Washington, DC. Memorandum M-05-03. December 16.

The National Academies (2003). Policy on Committee Composition and Balance and Conflicts of Interest for Committees Used in the Development of Reports. The National Academies (National Academy of Science, National Academy of Engineering, Institute of Medicine, National Research Council). May 12.

USACE (2007). Peer Review Process. Department of the Army, US Army Corps of Engineers, Washington, DC. CECW-CP Memorandum. March 30.

USACE (2010). Water Resources Policies and Authorities: Civil Works Review Policy. Department of the Army, US Army Corps of Engineers, Washington, DC. Engineer Circular (EC) No. 1165-2-209. January 31.

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APPENDIX A

**Final Panel Comments
on the**

**American River Watershed
Common Features Project
Natomas Post-Authorization Change Report
Main Report**

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Comment A01:

The sequence of the plan formulation process appears to be incomplete and is hard to follow; therefore, it is difficult to determine whether the National Economic Development (NED) Plan has been correctly identified.

Basis for Comment:

On Page 3-21 of the American River Watershed Common Features Project Natomas Post-Authorization Change Report (PACR), the order of the incremental analysis is identified. The Panel has identified several issues regarding the discussion on Pages 3-21 to 3-26, which may affect plan formulation and identification of the NED Plan (which also is the recommended plan).

- a. The top of Page 3-21 states that “Of the nine reaches analyzed, Reach D, at the Natomas Cross Canal (NCC), had the highest probability of failure. Therefore, for the incremental analysis, it was assumed that in the event of a flood, a failure at Reach D would occur first.” Fixing Reach D then becomes Increment #1. However, according to Table 2-7, it appears that the probability of failure for Reaches A, E, and F exceeds the probability of failure for D.
- b. If the choice of Reach D as the prime or “anchor” component is based on a combination of economics as well as probability of failure, this is not clear and the report, which would need to document this assumption more clearly and provide numeric support for it. Plates 8, 9, and 10 would seem to be a good beginning point for this discussion since Reach D appears to be the worst case scenario.
- c. It is recommended that a column for “Incremental Net Benefits” be added to Table 3-11 to show the net benefits added when each successive component is added. When this is done, it appears that Reach B, which adds about \$180 million in net benefits when added to D+A+E, provides the highest degree of incremental net benefits to the system. This does not take into account the probability of failure of B, which is relatively low, but based solely on economics, it would appear that B should be the “anchor” component. Again, if consideration was given to the combination of economics and probability of failure, it should be documented in the report text.
- d. Since planning is an iterative process, some sort of “Last-Added” analysis should probably be performed (ER 1105-2-100: Planning Guidance Notebook, Page E-3, under Step 3 which discusses “iterative reformulation”) to determine if the removal of one or more components from the identified alternative would provide greater net benefit.
- e. The last paragraph on Page 3-23 states that Figure 3-2 “shows that net benefits continue to increase until the 11th increment.” Based on Table 3-11, the increase appears to continue until the 9th increment.

Significance – High:

The plan formulation process must contain sufficient detail to justify the selection of the recommended plan.

Recommendation(s) for Resolution:

To resolve these concerns, the report would need to be expanded to include the following:

1. Additional information to clarify the step-by-step process followed to add components in the alternative formulation process.
2. Additional information/clarity regarding the choice Reach D as the primary component for consideration.
3. The addition of an “Incremental Net Benefits” column in Table 3-11.
4. The addition/documentation of a Last Added analysis to complete the iterative plan formulation process noted in the Planning Guidance Notebook (ER 1105-2-100).
5. Clarification regarding the statement on Page 3-23 regarding Figure 3-2 and the maximum net benefits.

Comment A02:
The discussion of induced development as it relates to Executive Order 11988 requires clarification.
Basis for Comment:
<p>Under Step #5 of the discussion on Executive Order (EO) 11988 (Page 4-38) in the Natomas PACR, the last paragraph states “The Preferred Blueprint Scenario assumes certain levels and locations of...greenfield development...including development on the land in the Natomas area that would be protected by the project.” On the following page, the text goes on to say, “...the project, while accommodating planned regional growth, is not growth inducing itself and is compliant with EO 11988.” Then, on Page 4-42, the first paragraph under Section 4-17 indicates that there is a building moratorium in Natomas based on the decertification of the levee system. Taking these statements together, it is difficult to prove that the levee system would not induce development (i.e., currently no additional development is permitted since the levee does not provide adequate protection for existing development, which is a safety issue; but once the levee is recertified, safety issues could be perceived as corrected and development will likely proceed but perhaps at a faster rate). It is unclear whether: (1) development would continue at the same pace in the Natomas basin if there were currently no moratorium, knowing that the levee has been decertified; and (2) once the levee is recertified, development would continue at the same rate as before. This would appear to be a difficult issue to resolve.</p>
Significance – High:
<p>The confusion in the text leads to questions about whether or not there actually is the possibility of induced development, and whether the recommended plan (also the Federally Supportable Plan, defined as the NED Plan), as identified, satisfies the requirements of EO 11988.</p>
Recommendation(s) for Resolution:
<p>To resolve these concerns, the report would need to be expanded to include the following:</p> <ol style="list-style-type: none"> 1. Additional clarification regarding the definition and application of induced development. 2. Refine the text on Pages 4-37 to 4-39 under Step #5 to avoid the apparent conflict.

Comment A03:
The assumptions that underlie the economic analysis need to address the discrepancy in the Without-Project Conditions that might affect plan formulation.
Basis for Comment:
In the economics appendix (Appendix H, Page 37), a detailed narrative of the major assumptions used is provided. The only Without-Project assumption for the Natomas Basin in the Natomas PACR was the NA3 condition. This assumes the addition of the 3.5-foot Folsom Dam raise, the Folsom Dam Joint Federal Project which that dealt with dam safety, and all of the Common Features in-place. The report does not address the likelihood of all of these modifications and conditions being performed or constructed, nor does it address when they might be constructed. The Natomas PACR does not mention any of the Common Features considered to be in-place. Based on the Natomas PACR and Appendix H, it appears the Natomas PACR does not include any of the Common Features; whereas, the Economic Appendix includes the Common Features. It is unclear (1) which assumptions are included in the Without-Project Conditions and (2) which Without-Project Conditions were used to compare the measures and alternatives for the National Economic Development (NED) plan.
Significance – High:
Due to the discrepancy in the Without-Project Conditions, there appears to be a fundamental problem that could affect the justification of the project.
Recommendation(s) for Resolution:
<p>To resolve these concerns, the report would need to be expanded as follows:</p> <ol style="list-style-type: none"> 1. Provide a detailed narrative that clearly outlines the Without-Project Conditions. This should include a narrative discussing the American River Common Features and whether or not they are included. 2. Provide a detailed narrative that clearly discusses the probability or likelihood of the Common Features being implemented and when the features will be completed.

Comment A04:

The Post-Authorization Change Report (PACR) does not explain the alternative for the closing of the Sankey Road Gap.

Basis for Comment:

The Environmental Impact Statement (EIS) reviewed in April 2010 (Draft Environmental Impact Statement – American River Watershed Common Features Project/Natomas PACR/Natomas Levee Improvement Program, Phase 4b Landside Improvements Project) did not contain information concerning the Sankey Road Gap Alternative and did not therefore provide a discussion of the potential impacts of the alternative or why it was not carried forward as a final alternative for the project.

While the Natomas PACR states that flooding through the Sankey Gap that would occur as part of the 100-year flood would not harm infrastructure or damage buildings, there is no analysis showing how that conclusion was reached. Analyses in the EIS showed flooding impacts to vernal fauna and that the impact of flooding could be cumulatively significant. If the Sankey Road Gap is not to be modified as part of this project, the Natomas Basin will still have flooding vulnerability for the 100-year event.

In addition, this level of protection seems to be in conflict with other portions of the Natomas PACR and EIS. For example, On Page PAC-8: “The Chief’s Report for the 1996 Supplemental Information Report specifies levee improvements to provide protection to a 400-year flood event.” Chapter 1 in the EIS includes the statement of the purpose and need. In that chapter the following statements are made:

- A. Page 1-1: “The overall purpose of the multi-phase NLIP is to bring the entire 42-mile Natomas Basin perimeter levee system into compliance with applicable Federal and state standards for levees protecting urban areas through a program of proposed levee improvements to address levee height deficiencies...” [NLIP is the Natomas Levee Improvement Program.]
- B. Page 1-2: “The NLIP is the Locally Preferred Plan (LPP), and includes the remedial actions in the Federal Plan as well as raising segments of the existing levee system up to a level 3 feet higher than SAFCA’s estimate of the water surface elevation produced by a 200-year ...flood event.”

If this was an early alternative that was not considered, there needs to be some means of explanation whereby it has been either eliminated or a better explanation of the alternative and the environmental impacts thereof. If the Sankey Road alternative was included in a previous Phase of the overall Natomas Basin levee improvements, there should be a reference included in the Natomas PACR and the Draft EIS referenced above.

Significance – High:

Exclusion of the Sankey Road Gap Alternative has the potential to impact the planning process and recommended plan.

Recommendation(s) for Resolution:

To resolve these concerns, the report would need to be expanded to include the following:

1. Further describe the Sankey Road Gap Closing Alternative and what it means to the entire Natomas Basin in the current PACR. If required, reference past documents where it has been explained and removed from further consideration.

Comment A05:

The most recent version of the report should reference the Environmental Impact Statement (EIS) as a report Appendix for the overall project.

Basis for Comment:

The Natomas PACR issued June 10 cited Appendix A as the Environmental Impact Statement (EIS) but did not specifically state the title of the EIS. The June 23 version now shows Appendix A as not used. The Panel feels that there is an important reference now missing from the Natomas PACR and Interim General Reevaluation Report (IGRR). The EIS referenced is assumed to be the Draft Environmental Impact Statement – American River Watershed Common Features Project/Natomas Post-Authorization Change Report/Natomas Levee Improvement Program, Phase 4b Landside Improvements Project, which was reviewed by the Panel in April 2010. The document contains the environmental discussion and impacts determination for the Common Features Project.

There are numerous references to this report throughout the PACR/IGRR:

- Page PAC-12: Section 15: “Improvements in the Natomas Basin have been the subject of several Environmental Impact Statements (EIS). A draft EIS for Reach 4-b is published with and is an integral part of the draft interim general reevaluation report.”
- Page 4-36: Chapter 4, Section 4-15: The paragraph starting “Public Involvement activities undertaken...” has several references to the EIS and its content without actually referencing Appendix A.
- Page 4-36: The last paragraph “Potential impacts associated with the Phase 4b Project” are identified in Chapter 4, “Environmental Consequences and Mitigation Measures,” of the Environmental Impact Statement/Environmental Impact Report (EIS/EIR). The Phase 4b Project also includes the creation of natural habitat that would serve ecological functions associated with natural floods (see Section 2.3.4, “Habitat Creation” of the EIS/EIR).
- Page 4-39, Chapter 4, Section 4-15, Point 6: The No-Action Alternative is described in Section 2.2, “No-Action alternative,” of the EIS/EIR.
- Page 6-1, Chapter 6, Section 6-2: The last sentence is “The comments and responses to them are summarized in the Public Involvement Section of the EIS/EIR (Appendix A).”
- Page 6-4, Chapter 6, Section 6-7: “This report is accompanied by the last in this series of environmental impact statements (Appendix A).”

Significance – Medium:

Without the EIS document as a reference, the basis for citations in the PACR main report is invalid. The EIS forms the basis for environmental decisions made in the final PACR/IGRR.

Recommendation(s) for Resolution:

To resolve these concerns, the report would need to be edited to include the following:

1. The Appendix A reference to the EIS and more clearly inclusion of the title and publication date.

Comment A06:

A conclusion or analysis on how past and current related studies or projects affect the Natomas Basin or how the proposed plan affects the overall flood risk management system needs to be included.

Basis for Comment:

The Natomas PACR addressed the past problems and need for a comprehensive flood risk management system given that previous flood management projects within limited reaches have resulted in modifications to the system that shifted local problems to other reaches. In addition, the report identified FloodSAFE and other agencies that try to meet overall flood risk management system goals; however, there is no discussion of how these other studies or projects affect the Natomas Basin or how the proposed plan affects the overall flood risk management system.

Significance – Medium:

The lack of information on how the other studies and projects affect the Natomas Basin or how the proposed plan affects the overall flood risk management system affects the completeness or understanding of the study.

Recommendation(s) for Resolution:

To resolve these concerns, the report would need to be expanded to include the following:

1. A narrative or conclusion that clearly provides an understanding of how the other projects or studies affect the Natomas Basin.
2. A narrative or conclusion on how the proposed plan affects the overall flood risk management system.

Comment A07:
The technical considerations contained in the rationale for eliminating certain alternatives should be further developed and results of evaluations documented.
Basis for Comment:
<p>In the “Measures Dropped From Consideration” (Section 3.4 beginning on Page 3-11) of the Natomas PACR, several alternatives were not evaluated for various reasons. The Yolo Bypass Improvements measure was one of the “public concerns” (Page 2-2); however, it appears that the reasons it was not addressed were that it is potentially too costly, beyond the scope of this project, would not be ready for authorization in the next Water Resources Development Act (WRDA), and that it does not address the performance (underseepage, etc.) of the existing levees around the Natomas Basin. None of these reasons appear to be identified as Planning Constraints in Section 2-5 of the Natomas PACR.</p> <p>According to ER 1105-2-100 Section 2-4, “Alternative plans shall not be limited to those the Corps of Engineers could implement directly under current authorities. Plans that could be implemented under the authorities of other Federal agencies, State and local entities and non-government interest should also be considered.” However, the Yolo Bypass management measure appears to have been screened out without much further consideration.</p> <p>Additionally, it would seem that the Hydrology and Hydraulics (H&H) Appendices should address those features that will affect hydrology and hydraulics even though they did not make it into the recommended alternative. Measures identified in Table 3-6 such as widening the Sacramento Bypass (Pages 3-12 and 3-13) and utilizing Transitory Storage (Pages 3-13 and 3-14) should be noted and results of evaluations documented, as appropriate, in the H&H Appendices.</p> <p>It is understood that the appendices for this particular study are “supporting” documents (as opposed to “stand-alone” documents). Therefore, it is further understood that the only analyses documented in the appendices are those that support the final selected alternative identified in the Natomas PACR (i.e., the supporting appendices would not necessarily document the entire plan formulation process and associated analyses).</p>
Significance – Medium:
The report text appears to be incomplete and additional clarification is necessary to support the elimination of several alternatives from the plan formulation process.
Recommendation(s) for Resolution:
<p>To resolve these concerns, the report would need to be expanded to include the following:</p> <ol style="list-style-type: none"> 1. A revision to the Project Constraints (Section 2-5) or additional support for elimination of the Yolo Bypass. 2. A brief description in the H&H Appendices of other measures that were considered and analyzed. 3. A brief description of the results in the H&H Appendices, as appropriate.

Comment A08:
The non-structural measure of buyouts/permanent relocations needs to be addressed in the main report.
Basis for Comment:
In Chapter 3 (Page 3-11) of the Natomas PACR, there are several measures that were removed from consideration with a brief comment regarding why they were eliminated (i.e., “concentrated urbanization”) along with a nonstructural measures matrix (Table 3-4). The Panel recommends the buyout/permanent relocation scenario in this chapter be further clarified to make the reader aware that this alternative was considered in terms of benefits and costs. The buyout measure should include a brief analysis of the number of structures that would need to be purchased (perhaps all of the Natomas Basin) along with an estimated rough cost. The measure would not likely be a feasible nonstructural measure but would complete the planning process by considering this component.
Significance – Medium:
Exclusion of the buyout scenario as a nonstructural measure affects the completeness or understanding of the study.
Recommendation(s) for Resolution:
<p>To resolve these concerns, the report would need to be expanded to include the following:</p> <ol style="list-style-type: none"> 1. Clarifying text explaining that the nonstructural buyout/permanent relocation measure was considered, and which that also includes an overall benefit and rough cost estimate.

Comment A09:
Public comments on the Natomas PACR need to be addressed in the report.
Basis for Comment:
Although some of the public comments have been addressed in the Natomas PACR, others have not. For example, some of the features mentioned in Comment I5-4 (i.e., making the river wider and deeper, removing levees from “islands” in the delta, and curtailing pumping during periods of high river flow conditions) did not appear to be addressed in the study process, nor were they part of the original public concerns (Page 2-1 of the main report).
Significance – Medium:
Additional clarification and discussion to adequately address the public concerns associated with this project is necessary as it supports the completeness or understanding of the report.
Recommendation(s) for Resolution:
<p>To resolve these concerns, the report would need to be expanded to include the following:</p> <ol style="list-style-type: none"> 1. A response to the issues raised in the Public Comments. 2. Further public involvement to discuss and address the relevant comments in the text.

Comment A10:

The Post-Authorization Change Report (PACR)/Interim General Reevaluation Report (IGRR) could be improved by referencing the report appendices, thereby directing the reader to more in-depth discussion of the technical details which form the basis of the conclusions.

Basis for Comment:

Chapter 2 – “*Problem Identifications*” in the Natomas PACR presents a good summary of the problems and opportunities that are addressed by the report. Extensive geotechnical analysis and evaluations of seepage and under-seepage, erosion levee stability, overtopping, vegetation and encroachments, hydrology, and hydraulics provide the basis for the discussions and conclusions in the report. These issues are then combined in the geotechnical risk and uncertainty analyses to develop levee performance curves, as shown in Table 2-6.

While the details of the elements underlying these discussions are very important in understanding the basis of the project, in the interest of being concise the Panel agrees with the approach of providing a brief summary of these issues. However the completeness of the report would be enhanced by referring the reader to the particular technical appendices where portions of the main report rely on these more detailed evaluations.

Additional reference to the technical appendices will enhance the technical quality of the project.

Significance – Low:

Addressing the references to the appendices will improve the technical quality of the report.

Recommendation(s) for Resolution:

To resolve these concerns, the report would need to be expanded to include the following:

1. Additional reference to the technical appendices where detailed analyses are relied upon to support the conclusion presented.

Comment A11:
Minor suggested changes to the document are recommended to improve the readability and understanding of the report.
Basis for Comment:
<p>There appear to be a number of editorial errors and inconsistencies in the Natomas PACR. Some examples include:</p> <ul style="list-style-type: none"> A. Some of the table references are not correct (e.g., Page 2-25: reference to Table 2-4 and 2-5 should be for Table 2-8 and 2-9. Reference to Table 2-6 should be for Table 2-10. Page 3-29, Table 3-16 is referenced as Table 3-17 under <u>Regional Economic Development</u>. Table 3-17 is referenced as Table 3-18 under <u>Other Social Effects</u>). Plate 14 is not referenced in the text at all. B. The report includes grammatical and editorial errors, such as <ul style="list-style-type: none"> • The last box of Table 3-18 is unclear • Page 4-1, under a) 1 should be edited • Page 2-5 lists damages for the 2-year and 500-year events, but these damage amounts do not match Table 2-10. • It is not clear why certain items in Tables 3-16, 3-17, 3-18 are not shaded as advantages when it appears that it is so. C. The current placement of the plates is awkward for the reader. D. Sankey Road is not clearly marked on the appropriate plate. E. The two sections of history are important as they contain different sets of information, but having them in two different locations in the report (Sections 1-4 and 2-3) is cumbersome. There appears to be two extensive sets of history; it may be possible to combine these two sections of the text for clarity. (Since Section 17 on Page PAC-13 is part of the executive summary, it seems reasonable to leave section “as is”).
Significance – Low:
The inconsistencies in references, grammatical errors, and other editorial issues may cause some confusion that could lead to misunderstanding of some of the findings and results.
Recommendation(s) for Resolution:
<p>To resolve these concerns, the report would need to be revised as follows include the following:</p> <ul style="list-style-type: none"> 1. Correct the grammar and reference errors (especially in Chapters 2 and 3), and resolve the discrepancies between damage amounts between Page 2-5 and Table 2-10. 2. Insert plates into the body of the report near where they are first referenced, rather than at the end of the document. 3. Mark Sankey Road on the appropriate Plate. 4. Combine Sections 1-4 and 2-3, as appropriate, to improve clarity.

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APPENDIX B

**Final Panel Comments
on the**

**American River Watershed
Common Features Project
Natomas Post-Authorization Change Report**

**Appendix A – Draft Environmental Impact Statement/
Draft Environmental Impact Report (DEIS/DEIR)**

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Comment B01:
Prehistoric Native American residents of the project area are not covered by Executive Order 12898 (Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations) and should be discussed separately.
Basis for Comment:
<p>The inclusion of Indian Tribes in Executive Order (EO) 12898 is specific for Federally Recognized Tribes and existing programs. It should only apply when there are Native American residents still in the area who are determined to be minority or low-income. Based on the documentation provided, this does not appear to be the case in the area of impact for this project. Interpretation of this Executive Order in this manner is outside the original scope and intent of the Order.</p> <p>In addition, the regulation applies to human health and environmental effects on low-income and minority populations. The repatriation of artifacts or remains does not meet that criterion. Based on the documentation provided in the Draft Environmental Impact Statement (DEIS)/Draft Environmental Impact Report (DEIR) on the American River Watershed Common Features Project/ Natomas Post-Authorization Change Report (PACR)/Natomas Levee Improvement Program, Phase 4b Landside Improvements Project, there are no tribal lands, nor a resident population in the Basin, thus there should be no Environmental Justice issue related to Native American issues.</p>
Significance – High:
Inclusion of prehistoric tribes in the Environmental Justice discussion could provide precedent for future projects where this same interpretation could be used to stop a project.
Recommendation(s) for Resolution:
<p>To resolve these concerns, the report would need to be changed as follows:</p> <ol style="list-style-type: none"> 1. Include a new section that addresses all of the Native American issues. 2. All of the concerns cited in this new section would be better addressed under the Native American Graves Protection and Repatriation Act (NAGPRA) and other cultural resource regulations, not Environmental Justice. Please refer to the following web site for the applicable regulations and other directives concerning the remains of identified and unidentified remains. http://www.nps.gov/history/nagpra/mandates/index.htm

Comment B02:
Construction timing related to the presence of Swainson's Hawk and the anadromous fish species should be clarified as to the potential for impacts to those species.
Basis for Comment:
<p>Swainson's Hawk does not appear to be a constant resident of the project area. However, the discussion of this particular species is not provided in light of when it can be expected to occur in the project area. The timing of water side vegetation removal can be better understood if the periods of residence are more clearly identified.</p> <p>For the anadromous fish species, the construction timing is less critical until the water side activities are undertaken, increasing the potential for erosion and sedimentation to affect individuals traveling up the American and Sacramento Rivers.</p> <p>There needs to be an additional discussion that explains what steps were taken for the previous phases dealing with these same species. Where restoration activities have been completed in previous phases that improve habitat for these species, the discussion should further clarify the activities and the benefits to these species.</p>
Significance – Medium:
The reasoning for construction windows can be better understood with a bit more specific information concerning the presence/absence for specific migratory bird and anadromous fish species
Recommendation(s) for Resolution:
<p>To resolve these concerns, the report would need to be revised as follows:</p> <ol style="list-style-type: none"> 1. Clarify the periods of residence or periods of migration for the bird and anadromous fish species.

Comment B03:

The likelihood of Native American remains in the project area is not well documented and the interpretation of such remains as a significant effect warrants further justification.

Basis for Comment:

Further clarification is needed on how to link definite significance to the potential disturbance of archeological resources, which may not be present, associated with the levee work.

Section 5.1.5.9 “Phase 1-4a Projects” (Page 5-18) of the DEIS/DEIR describes the potential for loss of cultural remains resulting from the Phase 1-4a Project. Wording used includes “It is likely that known or unknown archeological resources could be disturbed...” further, “If these resources would be eligible for National Register of Historic Places (NRHP) listing, their modification or destruction could be significant.” The section concludes that “despite the implementation of mitigation measures, USACE and SAFCA [Sacramento Area Flood Control Agency] determined that the Phase 1-4a Projects would result in a cumulatively significant incremental contribution.”

Under Phase 4b Project (Page 5-18, Line 3) “USACE and the State Historic Preservation Officer (SHPO) have concurred that most historic resources identified in the Phase 4b Project footprint lack significance that might make them eligible for listing on the NRHP or the California Register of Historic Resources.” Again, the section concludes “For these reasons, despite the implementation of Mitigation Measures...the Phase 4b Project (alternatives) would result in a cumulatively considerable incremental contribution to a cumulatively significant impact on archeological resources...”

Where a resource has either not been determined to be eligible for the NRHP or has specifically been determined to be insignificant, concluding that the cumulative impacts on such a resource could would “result in a cumulatively considerable incremental contribution” is not supported by the individual data. The Natomas PACR does not support a strong argument that suggests that this project area in general and the levee structures in particular have a fair potential to contain Native American remains.

In light of the creation of the levees in the early 1900’s (see Table 1-2) specifically for agricultural purposes, the potential for Native American remains in those levee structures does not appear to be supported for the conclusion of a cumulatively significant impact as stated.

Section 5.1.5.10 states that the determination of prehistoric fossils is low enough to not be considered as a cumulatively considerable increment. Given this statement in the report, the text does not appear to make a clear case for the potential to encounter Native American remains at any higher potential than fossils.

Significance – Medium:
The case for the occurrence of Native American remains is not convincingly made and, as documented, does not qualify as a significant effect.
Recommendation(s) for Resolution:
<p>To resolve these concerns, the report would need to be revised as follows:</p> <ol style="list-style-type: none"> 1. Reduce or remove the significant effect determination on Native American resources in Section 5.1.5.9.

Comment B04:
The overall readability of the document could be improved by incorporating additional details and some reorganization to the plate illustrations.
Basis for Comment:
<p>The Panel had difficulty reviewing and understanding the document because it was necessary to reference the back of each section for the cited plates in the DEIS/DEIR. The Panel recommends that the plates be incorporated into the document at or near the point of reference. This allows the reader to look and reread the section to understand what they have been told in light of the illustration. Also, the plates are not consistently oriented. The orientation for all figures should be North as up. For the landscape plates, the North arrow should be pointing toward the spine of the document, not toward the outside edge.</p> <p>Also, where there is a reference to a plate that has been included in a previous section, either recreate it in the existing chapter or make enough of a change to make it a new plate with additional information.</p>
Significance – Low:
Consistency allows the reader to better comprehend what is being written and explained.
Recommendation(s) for Resolution:
<p>To resolve these concerns, the report would need to be expanded as follows:</p> <ol style="list-style-type: none"> 1. All plates should be oriented with the North arrow pointing up. For landscape plates, the North Arrow should be pointing toward the spine of the document.

Comment B05:
The final use for topsoil that has been stripped from farmable land areas should be reconsidered for locations where the borrow area will be transformed as detention ponds or managed wetlands.
Basis for Comment:
<p>The purpose of topsoil stripping is to preserve the soil in its original use. Where the use of the land has been changed from farmland to a detention pond, the soil will be wasted by placing it underwater. The stripped topsoil should be used for filling the canals that are proposed to be returned to farmland. Replacing the topsoil in this use will improve the farmland aspect of the restored habitat.</p> <p>If the land is going to be converted to a wetland, the same principle applies; placing good topsoil under permanent or temporary wetland habitat is a waste of useful topsoil. The wetland soils will develop in a short time. Even wetland vegetation will not need good topsoil to establish or grow.</p>
Significance – Low:
Although this issue does not have a significant impact on the project, the stripped topsoil could be put to better use than that currently described in the report.
Recommendation(s) for Resolution:
<p>To resolve these concerns, the report would need to be revised to include the following:</p> <ol style="list-style-type: none"> 1. A suggested reuse of topsoil in areas where farmable land is stripped and the borrow area will be changed to either wetland or stormwater detention pond. The farmland topsoil should be put to beneficial use in creating or enhancing lands that could be farmed. One example would be filled canals where the new fill connects adjacent fields. The topsoil can be placed to create a larger farmable area.

Comment B06:

The discussion of Impacts to Fish and Aquatic Habitats is not well constructed and not thoroughly supported.

Basis for Comment:

The paragraphs should be rearranged in Section 4.7-2 of the DEIS/DEIR. As currently written, the discussion of impacts has the finding (potentially significant or too speculative for meaningful consideration) as the ending thought of the paragraph. The reader should be prompted with the finding first and the supporting text upholding the finding. This becomes hard to follow especially in the section (4.7-j) titled “Impact” 4.7-j (specifically, Pages 4.7-40 to 4.7-41). The statement of finding (or fact) should be introduced first, followed by the explanatory text.

In the discussion of salmonid olfactory cue vs. pump outflow (Page 4.7-43, Interference with Migration of Migratory Fish Species), it was difficult to comprehend the finding of “less than significant” on the first reading. Anadromous fish start their migration in response to increased flow, but turn to olfactory imprint to determine the migratory pathway upstream. It is the Panel’s opinion that flows at drainage outfalls do not appear likely to cause disorientation of migrating individuals. Placing this information in the paragraph unduly clouds the final determination that the interference is less than significant (determination on Page 4.7-44).

The eventual conclusion that fish species will avoid the area is correct (Page 4.7-40, last paragraph). According to mitigation measure 4.7j – point 2, the coordination with the National Marine Fisheries Service (NMFS) will be aimed at timing construction to avoid the presence of special status fish. However, the determination that the impacts will be potentially significant for the Adjacent Levee alternative appears contradictory to the conclusion that the impact is less than significant (cited above). After the mitigation efforts have been followed, the Panel is in agreement that there will be a less than significant effect (stated on Page 4.7-42, last paragraph).

The Panel found that the discussion of disturbance to special-status vernal pool crustaceans (Page 4.7-36) was not adequately supported by the statement that flooding could destroy special status crustaceans and their habitats. The species of vernal pool crustaceans are aquatic and reproduce in response to the presence of water in the normal vernal pool habitat. The flooding of the Natomas Basin could actually result in an increase of the population throughout the Basin. In the following section (Adjacent Levee Alternative), there appears to be a contradictory statement that the vernal pools that will be created in the Triangle Properties Borrow Area will actually provide habitat for vernal pool crustaceans because of the increased period of inundation. If that has a beneficial effect on these species, flooding of the basin should also have a similar effect.

Finally, some consideration should be made to ensure that the water side of the levees provides some suitable refugia and habitat for resident and migrating species. The vegetation

being removed from the water side levee slopes should be considered useful in implementing “living shoreline” habitat along the riverbanks. This will be a better alternative to strictly rip-rap or other hardening and will also provide some protection from the water overheating due to lack of shading which could result from the removal of the vegetation initially.

The current impacts (4.7-i and 4.7-j) state that there will be no impact to either resource (special fish species and vernal pool crustaceans) from the No-Action alternative. Clearing of waterside vegetation will have potential impacts to fish species. Lack of levee improvements will result in changes to vernal pool habitat with the potential failure of the levees and flooding expected to result. Thus, both resources will be impacted by the No-Action alternative. The description of these impacts should be more clearly stated.

Significance – Low:

Readability and completeness of the ideas presented should be more comprehensive and consistent to provide some impacts and potential improvements to habitat even from the No-Action alternative.

Recommendation(s) for Resolution:

To resolve these concerns, the report would need to be revised as follows:

1. Improve the description of the actual impacts and benefits to vernal pool crustaceans and special status fish species associated with all alternatives (including the No-Action alternative).

APPENDIX C

**Final Panel Comments
on the**

**American River Watershed
Common Features Project
Natomas Post -Authorization Change Report**

**Appendix B – Hydrology and
Appendix D – Hydraulic Design**

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Comment C01:
The assumption of “no hydraulic impacts” is unclear and may not be appropriate under the With-Project Condition.
Basis for Comment:
<p>There appears to be a lack of description regarding what the With-Project Conditions include. Additionally, there does not seem to be an identification of the locations to which this assumption applies. As a result, it is not clear from the text (Pages 46 and 54) in Appendix D what hydraulic impacts are being referred to (i.e., within Natomas, along the Sacramento River, along the American River, along the Natomas Cross Canal (NCC), or along the Natomas East Main Drain Canal (NEMDC)).</p> <p>If the location is within Natomas, it is not clear why there are no hydraulic impacts to consider except under the levee raise scenario. If failure is due to piping, then it would be expected that the With-Project (without levee raise) would address the potential for piping failure and yield a difference in hydraulic impacts when comparing Without-Project to With-Project Conditions. If armoring is provided to allow water over the top of the levee to prohibit/reduce the risk of overtopping failure, then it would seem this would also affect hydraulic impacts. Section 4.3.5 (Page 54) provides clarity to hydraulic impacts; however, by assuming no impacts, the text appears to indicate that the levee will fail and flood the Natomas Basin equally under both Without-Project and With-Project scenarios.</p> <p>If the location is along the Sacramento River, the American River, the NCC, or the NEMDC, it is difficult to determine whether this is an appropriate assumption without an understanding of the modifications proposed under the With-Project Condition.</p>
Significance – Medium:
The lack of clarity to the hydraulic impacts impedes a complete understanding of the analysis performed and the results of that analysis.
Recommendation(s) for Resolution:
<p>To resolve these concerns, the report would need to be expanded to include the following:</p> <ol style="list-style-type: none"> 1. A brief description in Appendix D defining the differences between the Without-Project and With-Project (without levee raise) Conditions (i.e., a description of the type of physical features to be examined during the With-Project analysis) 2. A discussion explaining why the With-Project (without levee raise) Condition would not affect hydraulics.

Comment C02:
The assumption of stage-frequency relationships for reaches F, G, and H, as described in the first paragraph of Section 4.1 in Appendix D is not well supported by Figure 2-14.
Basis for Comment:
<p>From the text in Appendix D, it is difficult to determine what information is being derived from which source for reaches A, D, E, F, G, and H for use in the HEC-FDA analysis (particularly reaches F, G, and H). The way the text reads, it appears that the stage-frequency data for these reaches is being derived from similar data on reaches B, C, and I. As an example, it is not clear how the stage-discharge relationship developed at G relates to either the stage-flow or stage-frequency relationships at B, C, or I. Figures 2-16 and 2-17 indicate different stages when comparing the NCC profiles with the NEMDC profiles upstream of the pump station. If the intent (using G as an example) is to state that the stage-frequency relationship is derived by taking the stage from the NEMDC HEC-RAS model and the frequency from the Sacramento River HEC-RAS model, this is not clear. Reach F has a similar issue. Reach H would not appear to be affected directly by backwater given the profiles shown on Figures 2-14, 2-17, and 2-20.</p>
Significance – Medium:
<p>Since this explanation appears to be directly related to understanding how the hydrologic and hydraulic data are derived for input into the HEC-FDA model, a firm understanding of the relationships between the reaches is necessary.</p>
Recommendation(s) for Resolution:
<p>To resolve these concerns, the report would need to be expanded to include the following:</p> <ol style="list-style-type: none"> 1. A modification to the text of Section 4.1 providing additional detail on the stage-frequency relationships between the various reaches for clarification.

Comment C03:
The approach for generating peak flow frequency curves for Dry and Arcade Creeks should be clarified by providing the relationship for the development of peak flows, and a statement discussing the amount of floodplain storage being utilized in the routing of flood flows.
Basis for Comment:
<p>In the last paragraph on Page B3-2 (Appendix B) and again in the last paragraph on Page B3-5, statements are made regarding developments/adjustments of peak flows based on drainage area relationships. However, no description of these relationships is provided.</p> <p>Also, in Table 1 (Page B3-3), the flows for the HEC-1 calibration are lower at NEMDC than at Vernon Street. At first glance, this would seem unlikely since one-third of the watershed contributes between these two locations. However, it is recognized that there may be a significant amount of floodplain storage being utilized that exists between these nodes. The follow-up discussion in Section 7.6 (Pages B3-21 to B3-22) is good, but information may be needed earlier in the report to avoid confusion.</p>
Significance – Low:
This comment is for clarification only and will not affect the recommendation of the project.
Recommendation(s) for Resolution:
<p>To resolve these concerns, the report would need to be expanded as follows:</p> <ol style="list-style-type: none"> 1. For clarification, it would be beneficial to the reader to see the equation or relationship used to make the adjustment to the peak flows. 2. A statement addressing this flow reduction (in the downstream direction) in the paragraph preceding the Table 1 would provide some additional clarification.

Comment C04:
A clarification of the higher FLO-2D water surface elevation relative to the HEC-RAS water surface at the upstream end of Figure 1-8 needs to be provided.
Basis for Comment:
<p>Although Figure 1-8 on Page 28 of Attachment 2 (Appendix D) does not appear to directly relate to the Natomas Basin, this figure was reviewed along with the associated text on Page 27. From this information, it is difficult to understand how the FLO-2D water surface can be higher than the HEC-RAS water surface at the upstream end of the profile. It is unclear whether there is internal drainage behind the American River Levee (in the north floodplain) which causes this occurrence.</p> <p>Also, the y-axis of this figure is identified as “WSEL, ft.” Since there is a difference in datum between FLO-2D and HEC-RAS, it is not clear whether some manual adjustment has been made or if the HEC-RAS is shown on NGVD29 and the FLO-2D on NAVD88.</p>
Significance – Low:
This comment is for clarification only and will not affect the recommendation of the project in the Natomas Basin.
Recommendation(s) for Resolution:
<p>To resolve these concerns, the report would need to be expanded as follows:</p> <ol style="list-style-type: none"> 1. Provide clarification to the text on Page 27 (Attachment 2) to describe how this condition on Figure 1-8 occurs. 2. Provide clarification in the text regarding the y-axis of Figure 1-8.

Comment C05:
The location of the storage areas in relation to cross section locations in the HEC-RAS model is unclear.
Basis for Comment:
Without detailed knowledge of the topography of the upper reaches of the NEMDC, Pleasant Grove Creek Canal (PGCC), and NCC portions of the study area, it is difficult to say whether the assumption of using storage areas to model these areas is appropriate. If the topography is generally flat in these reaches, it may be a reasonable assumption. However, if there are inflows entering these areas from the east, it is quite possible that the use of cross sections which show “artificial” increases in water surface (Section 2.2.2.1 of Appendix D), instead of storage areas which show flat water surfaces, would represent a more realistic assumption. Since this is an interim approach, the method of analysis may be reasonable.
Significance – Low:
This comment is for clarification only and will not affect the recommendation of the project.
Recommendation(s) for Resolution:
<p>To resolve these concerns, the report would need to be expanded as follows:</p> <ol style="list-style-type: none"> 1. A diagram in Section 2.2.2.1 showing the locations of the storage areas used in the HEC-RAS model in comparison to cross section locations in the upper reaches of the NEMDC, PGCC, and NCC would assist in understanding the model better.

Comment C06:
Method 2 of the procedure for the downstream boundary condition requires some additional clarification to be differentiated from Method 1.
Basis for Comment:
<p>As defined on Page 4 of Attachment 3 (Appendix D), Method 1 includes tidal influences and Method 2 excludes tidal influences. However, Figure 13 of Attachment 3 shows oscillation for Method 2 that would appear to be a result of tidal fluctuation. The Panel might expect the results of Method 2 (as shown on Figure 13) to rise and fall without oscillation.</p> <p>For the analysis contained in the Natomas PACR, the downstream boundary procedure appears to be adequate as the effects of tidal influences are not expected that far upstream along the Sacramento River.</p>
Significance – Low:
This comment is for clarification only and will not affect the recommendation of the project.
Recommendation(s) for Resolution:
<p>To resolve these concerns, the report would need to be expanded to include the following:</p> <ol style="list-style-type: none"> 1. Clarification in the text regarding the oscillation in Method 2.

Comment C07:

The effect of the datum differences on frequency-damage curves for the Natomas Basin needs additional clarification.

Basis for Comment:

Since the FLO-2D model is on the NAVD88 datum (Page 36 in Appendix D) and the HEC-RAS model is on the NGVD29 datum, reconciliation of the datum differences should be considered when creating frequency-damage curves within the Natomas Basin for use in HEC-FDA.

The Panel recognizes that reconciliation of the datum differences is underway and according to VERTCON data (http://www.ngs.noaa.gov/cgi-bin/VERTCON/vert_con.prl) the datum difference is approximately 2.5 feet (with NAVD88 being higher).

Page 36 notes that “the datum is not important for the relation of the models.” However, while it is expected that there will be no significant changes to plan formulation related to this adjustment, it should be remembered (if the Panel understands correctly) that the frequency-damage relationships are dependent on the interaction of the HEC-RAS and FLO-2D models together and this interaction is dependent on datum reconciliation. HEC-RAS produces a frequency-stage relationship and a frequency-flow (flow through the breach) relationship, while FLO-2D produces a flow-depth relationship which is then related to a depth-damage curve. Together, the HEC-RAS frequency is related to the FLO-2D depth-damage data to produce a frequency-damage relationship. The critical link in this system may be the flow through the breach. If the relative tailwater through the breach is actually 2.5 feet lower than originally analyzed, then more flow may be able to flow through the breach, yielding more volume in the Natomas Basin and higher depths and damages.

Significance – Low:

Providing additional text regarding the reconciliation of the datum differences between HEC-RAS and FLO-2D will provide technical clarity to the report.

Recommendation(s) for Resolution:

To resolve these concerns, the report would need to be expanded to include the following:

1. Resolution of the datum differences

or

2. Discussion relating to the difference in datum and the effects on frequency-damage curves, and
3. Some discussion regarding how the datum difference affects the interaction between HEC-RAS and FLO-2D.

Comment C08:
The discussion of hydraulic uncertainty in Section 4.2.1 requires clarification.
Basis for Comment:
<p>The result of 0.5 feet for <i>Snatural</i> should be re-verified since the equation at the bottom of Page 48 is in metric units and the result provided is in English units.</p> <p>Also, in the third to last sentence in this section (Section 4.2.1, Page 49 in Appendix D) it is unclear which “these” is being referred to when it says “these values were then used” (i.e., values from the equation or values from the reports).</p>
Significance – Low:
This comment is for clarification only and will not affect the recommendation of the project.
Recommendation(s) for Resolution:
<p>To resolve these concerns, report would need to be revised as follows section of the report should be:</p> <ol style="list-style-type: none"> 1. Section 4.2.1 of the report should be reviewed by a technical editor to address confusing or conflicting information in the report.

Comment C09:
Figures 2-14, 2-17, and 2-20 should label the pump station location along the profile to avoid confusion.
Basis for Comment:
The profiles for the NEMDC show a rather large discontinuity at about Mile 7.0. The Panel was able to determine that this was due to the location of the pump station along the NEMDC upstream of the Dry Creek confluence. However, identification of the pump station on the profile would be beneficial to the reader.
Significance – Low:
This comment is for clarification only and will not affect the recommendation of the project.
Recommendation(s) for Resolution:
To resolve these concerns, the report would need to be expanded to include the following: <ol style="list-style-type: none"> 1. An identification of the pump station location on Figures 2-14, 2-17, and 2-20.

Comment C10:

The adjustment to the 2-year stages provided in Section 4.1 need additional details.

Basis for Comment:

On Page 47, under Section 4.1 (Appendix D), the adjustment to the 2-year stages is somewhat unclear when it comes to translating the stage adjustment from the gage location to the index points. It was assumed by the Panel that “index points” referred to the breach locations shown on Figure 2-11. Unless the index points refer only to locations along the Sacramento River, it would seem that the difference between the calculated 2-year stage and the gaged 1- and 2-year stages on the Sacramento River would not necessarily be equivalent to the difference between the calculated 2-year stage and the translated 1- and 2-year stages at the index point. In other words, one foot of difference between the calculated 2-year and the gaged 2-year on the Sacramento River would not necessarily translate to a one foot difference between the calculated 2-year and the adjusted 2-year on the NEMDC.

Significance – Low:

This comment is for clarification of additional details and will not affect the recommendation of the project.

Recommendation(s) for Resolution:

To resolve these concerns, the report would need to be expanded as follows include:

1. Additional information should be added regarding the definition of “index points.”
2. Additional clarification should be added related to the translation of data to these index points.
3. This section of the report should also be reviewed by a technical editor to address confusing or conflicting information.

Comment C11:
It is unclear whether the discussion of the backwater effects on levee breaches in the HEC-RAS model pertains to tailwater on the other side of the breach, or backwater from another flooding source.
Basis for Comment:
<p>On Pages 26 to 27 of Attachment 2 (Appendix D), there is discussion relating how backwater will affect the levee breaches in the HEC-RAS models. As noted in the comment statement, it is unclear from the text whether the term “backwater” pertains to tailwater on the other side of the breach, or backwater from another flooding source. Assuming the discussion reflects tailwater issues (since the first paragraph on Page 27 makes mention of backwater effects on lateral weirs), the approach taken to model the breaches seems appropriate. However, there are a few details regarding this modeling approach that lead to some confusion.</p> <p>Although not completely clear, the text appears to indicate that the storage areas used in the HEC-RAS model define the breach inundation areas. From this, it is not clear whether the elevation-volume relationships used to define the storage areas were developed using the same data as the FLO-2D terrain data (i.e., whether they are on the NGVD29 datum or the NAVD88 datum).</p> <p>It should be noted that if this modeling approach contains two different datums in the HEC-RAS model, the approach will need to be revisited once the datum adjustment has been performed to bring the RAS model to the NAVD88 datum. This will likely affect the understanding of how the backwater/tailwater interacts with the headwater through the breach.</p> <p>Also, please note that Figures 1-12 and 1-13 mentioned at the top of Page 27 were not included in this attachment.</p>
Significance – Low:
This comment is for clarification only and will not affect the recommendation of the project.
Recommendation(s) for Resolution:
<p>To resolve these concerns, the report should be revised as follows section of the report should be:</p> <ol style="list-style-type: none"> 1. This section of the report should be reviewed by a technical editor to address confusing or conflicting information in the report. Figures 1-12 and 1-13 should also be added to the report.

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APPENDIX D

**Final Panel Comments
on the**

**American River Watershed
Common Features Project
Natomas Post- Authorization Change Report**

Appendix F – Geotechnical Analysis

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Comment D01:
Document readability and clarity of Appendix F would be improved by including an additional figure at the beginning of the document labeling levee miles within each reach.
Basis for Comment:
Appendix F in the Natomas PACR is organized by systematically detailing each levee unit. In discussing locations of units, reaches, and individual locations of critical index points within each reach, Appendix F refers to river miles (RM) and levee miles (LM) (as shown in Tables 3-1, 5-1, and 5-2) as well as local names (e.g., Joe's Landing, Prichard Lake Pumping Station.). While this is generally sufficient for a reader to find a particular location based on the descriptions of levee mile markings and maps provided, it is cumbersome to search for the index points locations and can also be confusing, as the levee mile system is different for each of the levee units addressed.
Significance – Medium:
Labeling LM's on existing figures (e.g., Figure 5-1) early in the text, would greatly enhance the readability, as the reader would be able to quickly identify the location being discussed without disrupting the flow of reading and understanding of the levee characteristics and/or issues being addressed.
Recommendation(s) for Resolution:
<p>To resolve these concerns, the report would need to be expanded to include the following:</p> <ol style="list-style-type: none"> 1. Either labeled levee miles on a single figure such as Figure 5-1, or better, individual figures of each reach depicting levee mile markings, reference points, and locations of critical sections.

Comment D02:
Document readability and clarity could be improved by showing Without-Project and With-Project combined fragility curves.
Basis for Comment:
The risk and uncertainty (R&U) analysis generates fragility curves for the existing (Without-Project) and future (With-Project) Conditions. From the point of view of risk, the expectation of these fragility curves over the annual exceedance probabilities of various water heights is a critical consideration. Thus, the changes made in the fragility curves due to the project are an important piece of information to the reader. In Appendix F, the two respective fragility curves appear in different places, making cross comparison difficult or at least inconvenient. The Natomas PACR would be enhanced by plotting the two fragility curves for each reach on the same plot.
Significance – Medium:
This issues effects the overall understanding of geotechnical risk and reliability for the project.
Recommendation(s) for Resolution:
<p>To resolve these concerns, the report would need to be expanded to as follows:</p> <ol style="list-style-type: none"> 1. Combine the two fragility curves for each levee reach on the same figure to facilitate easy comparison. 2. Add a discussion for each levee reach of how the project changes the corresponding fragility curve, and any comments thought to be relevant about that change.

Comment D03:
A validation of historical experience of flood height and levee performance should be provided to support the fragility curve for levee failure, which seems high for some reaches.
Basis for Comment:
<p>Significant flood events have occurred in 1986, 1997 and 2006. Slope failures and underseepage, as exhibited by sand boils, were reported during these events. Appendix F, Section 5.1, of the Natomas PACR indicates that “seepage/sand boils and sliding historical conditions” were considered in the R&U analyses; however, it is unclear as to how the historical performance was incorporated into the R&U analysis. In order to validate the R&U analysis, it would be useful to correlate the computed risk with the observed past performance.</p> <p>Appendix F evaluates the probability of failure at various water surface elevations; however, there is no reference to historical water surface elevations or past performance at these elevations.</p>
Significance – Medium:
This issue affects the overall understanding of geotechnical R&U for the project.
Recommendation(s) for Resolution:
<p>To resolve these concerns, the report would need to be expanded to include the following:</p> <ol style="list-style-type: none"> 1. An additional figure showing <ul style="list-style-type: none"> • historical seepage/sand boils and slide locations along with water surface elevations during the corresponding events, • locations of levee reaches and index points, and • computed probability of failure at the index points for water surface elevations associated with the corresponding flood events. 2. A discussion of the correlation between predicted and observed performance should be included following Section 5.6.

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APPENDIX E

**Final Panel Comments
on the**

**American River Watershed
Common Features Project
Natomas Post-Authorization Change Report**

Appendix H – Economics

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Comment E01:
The incremental analysis floodplain assignments (i.e., water surface profiles) used to perform the increments, or order of fixes, is unclear.
Basis for Comment:
Appendix H (Economics) assigns the floodplain for each increment by evaluating those that were removed from the “mix” of floodplains due to previous fixes and the floodplain(s) that still remain. It appears that existing water surface profiles (floodplain assignments) were used based on what the perceived water surfaces would be after “the fix” was performed. It is unclear how and why this approach was utilized rather than developing a new Hydrology and Hydraulics (H&H) model with new water surface profiles for each entry into the HEC-FDA model.
Significance – High:
Using existing floodplain assignments (water surface profiles) rather than modeled floodplain assignments could affect the order of the incremental analysis, which could lead to a fundamental problem that could affect the plan formulation process.
Recommendation(s) for Resolution:
<p>To resolve these concerns, the report would need to be expanded as follows include the following:</p> <ol style="list-style-type: none"> 1. Use H&H modeled floodplain assignments for each index point after the increment has been performed and re-run the HEC-FDA for each incremental analysis based on the new and modeled floodplain assignments. 2. Provide a detailed narrative that describes this methodology with the results.

Comment E02:

The technical soundness and clarity of the incremental benefit analysis could be improved by performing a “Last Added” increment as a separate action.

Basis for Comment:

As a justification of each alternative for the plan, a last added analysis should be performed (ER 1105-2-100: Planning Guidance Notebook, Page E-3, under Step 3 which discusses “iterative reformulation” in Appendix H) to determine if the removal of one or more components from the identified alternative would provide greater net benefit.

Significance – Medium:

The last added analysis is part of the USACE planning process and affects the completeness of the study; it should be implemented as outlined in ER 1105-2-100.

Recommendation(s) for Resolution:

To resolve these concerns, the report would need to be expanded as follows include the following:

1. Perform a last added incremental analysis to reasonably maximize overall project benefits.
2. Provide a narrative or charts that outline the procedure and show each incremental benefit for each measure.
3. Provide a conclusion of the Last Added analysis.

Comment E03:
A detailed narrative on the major economic assumptions is provided, but does not address the likelihood that the proposed modifications assumed for the NA3 condition will occur.
Basis for Comment:
The only Without-Project Conditions assumptions for the Natomas Basin in Appendix H was the NA3 condition. This assumes the addition of the 3.5 foot Folsom Dam and Reservoir raise, the Folsom Dam Joint Federal Project which that dealt with dam safety, and all of the Common Features in place. The Economics Appendix of the Natomas PACR does not address the likelihood of all of these modifications and conditions being performed or constructed or when it might happen, nor does it justify why the Without-Project Conditions was used. The Economic Appendix of the Natomas PACR does not explain if the Natomas Basin, which is part of the American River, benefits from the Common Features being added or not.
Significance – Medium:
A clear understanding of what assumptions were made for the Without-Project Conditions is needed to evaluate each component, measure, alternative, and/or plan formulation
Recommendation(s) for Resolution:
<p>To resolve these concerns, the report would need to be expanded as follows to include the following:</p> <ol style="list-style-type: none"> 1. Provide a detailed narrative that clearly outlines the Without-Project Conditions. This should include a narrative discussing the American River Common Features and if they affect the Natomas Basin. 2. Provide a detailed narrative that clearly discusses the probability or likelihood of the Common Features being implemented and when the features will be completed.

Comment E04:
The sensitivity analysis that was performed on the Without-Project damages and With-Project benefits is well supported and documented but needs to be clarified.
Basis for Comment:
<p>The Panel acknowledges and agrees with the sensitivity analysis performed to try to quantify and be cognizant of the over-estimation of benefits in Natomas Basin. It appears the estimation of benefits is based on the Without-Project Conditions and then considers the increments outlined in the incremental analysis (Chapter 6 of Appendix H). The first increment (“fix” NAT D) decreases the damage by 24%; however, using this incremental analysis scenario it decreases it by 26% which is an increase in benefits. This increase in reduction of damages is amplified and increases for each increment fixed. These results do not appear to reduce the With-Project benefits, instead they increase them. It is also unclear how the sensitivity model reacts to each increment fixed. Chapters 7a and 7b does not clearly describe how the sensitivity model reacts to each increment fixed. The Panel would assume that there would be more rebuilding based on the number of increments fixed, which implies that as the benefits start accruing from each incremental fix, residents would be less likely to move out of the Natomas Basin even if there was a flood event.</p>
Significance – Medium:
It is not clear in the sensitivity model how the benefits are increased and how the sensitivity model reacts to increments fixed.
Recommendation(s) for Resolution:
<p>To resolve these concerns, the report would need to be expanded as follows include the following:</p> <ol style="list-style-type: none"> 1. Provide a detailed narrative and/or chart comparing the sensitivity analysis results to the incremental analysis in Chapter 6. 2. Provide a detailed narrative explaining how the sensitivity analysis supports or reacts to each incremental fix.

APPENDIX F

Final Charge to the Independent External Peer Review Panel

as

Submitted to USACE on April 8, 2010

on the

Draft Natomas Post-Authorization Change Report IEPR

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**Final Charge Guidance and Questions for the Peer Reviewers
for the Draft Natomas Post-Authorization Change Report and Draft Environmental
Impact Statement IEPR**

BACKGROUND

The American River Common Features project (Common Features) is being developed to provide flood risk management to the City of Sacramento, including the Natomas Basin and areas along the north and south sides of the American River. This fast-growing region in the country's most populous state, the Greater Sacramento area encompasses the floodplains of two major rivers—the Sacramento and the American—as well as additional rivers and tributaries that drain the Sierra Nevada mountains. Expanding urban centers lie in floodplains where flooding could result in extensive loss of life and billions in damages.

Authorized in 1996, the Common Features project consists primarily of levee creation and modification, in addition to flood warning systems and pumping capabilities. However, since authorization, increased understanding of under seepage and through seepage problems that jeopardize levee stability have substantially increased project costs. Consequently, a general engineering and economic reevaluation is necessary to determine if the alternative proposed is still viable and justified and if there is another alternative that may be more effective. The Common Features Project General Reevaluation Report (GRR) includes flood risk management to the City of Sacramento and the Natomas Basin. The purpose of the GRR is to develop analysis tools that consider the flood protection system as a whole and identify a comprehensive plan that will lower the risk of flooding in and around Sacramento. The objective of this study is to re-evaluate the currently authorized plan as well as to develop and evaluate other viable alternatives, including a locally-preferred plan.

Having completed the initial increment of the independent external peer review (IEPR) of documentation of the existing geotechnical conditions the American River Common Features project, USACE is preparing for an IEPR of investigations to analyze the conditions that would result from implementing project alternatives. Recently it has been determined that a "Natomas Post-Authorization Change Report" will be prepared prior to the "Common Features General Reevaluation Report". This decision provides more focused technical investigations that are responsive to the Federal legislative calendar.

OBJECTIVES

The objective of this work is to conduct an independent external peer review (IEPR) of the draft Natomas Post-Authorization Change Report, Environmental Impact Statement, and related appendices in accordance with the Department of the Army, U.S. Army Corps of Engineers, Water Resources Policies and Authorities' *Civil Works Review Policy* (EC 1165-2-209) dated January 31, 2010 and the Office of Management and Budget's *Final Information Quality Bulletin for Peer Review* released December 16, 2004.

Peer review is one of the important procedures used to ensure that the quality of published information meets the standards of the scientific and technical community. Peer review typically

evaluates the clarity of hypotheses, validity of the research design, quality of data collection procedures, robustness of the methods employed, appropriateness of the methods for the hypotheses being tested, extent to which the conclusions follow from the analysis, and strengths and limitations of the overall product.

The purpose of this IEPR is to analyze the geotechnical conditions that would result from implementing project alternatives presented in the Draft Natomas Post-Authorization Change Report and to assess the adequacy and acceptability of economic, engineering, and environmental methods, models, and analyses used for the project. The IEPR will be limited to technical review and will not involve policy review. The IEPR will be conducted by subject matter experts (i.e., IEPR panel members) with extensive experience in engineering, economics, and environmental issues relevant to the project. They should also have experience applying their subject matter expertise to flood risk management.

The panel members will be “charged” with responding to specific technical questions as well as providing a broad technical evaluation of the overall project. Per EC 1165-2-20, Appendix D, reviews should identify, explain, and comment upon assumptions that underlie all the analyses, as well as evaluate the soundness of models, surveys, investigations, and methods. Review panels should be able to evaluate whether the interpretations of analysis and the conclusions based on analysis are reasonable. Reviews should focus on assumptions, data, methods, and models. The panel may offer their opinions as to whether there are sufficient analyses upon which to base a recommendation.

DOCUMENTS PROVIDED

The following is a list of documents and reference materials that will be provided for the review. **The documents and files presented in bold font are those which are to be reviewed.** All other documents are provided for reference.

- **Draft Natomas Post-Authorization Change Report**
- **Draft Environmental Impact Statement**
- **Geotechnical Appendix, including analyses for the proposed alternatives (including seepage, stability, and risk and uncertainty analyses)**
- **Hydrology and Hydraulics Appendix for the With- Project Conditions**
- **Economic Appendix Containing With-Project Analyses of Damages and Benefits**
- Common Features IEPR final report, including IEPR panel comments and USACE draft responses
- Agency Technical Review report
- Public Comments from review of draft report and draft NEPA document
- USACE guidance *Civil Works Review Policy* (EC 1165-2-209) dated January 31, 2010
- CECW-CP Memorandum dated March 31, 2007
- Office of Management and Budget’s *Final Information Quality Bulletin for Peer Review* released December 16, 2004.

SCHEDULE

TASK	ACTION	DUE DATE
Conduct Peer Review	Battelle/panel Kick-off Meeting	4/6/2010
	USACE/Battelle/NEPA Impact Assessment Kick-off Meeting (Sacramento, CA)	3/31/2010
	Draft EIS, Geotechnical, and H&H	
	Draft EIS, Geotechnical, and H&H Review Documents provided to peer reviewers	4/5/2010
	External peer reviewers complete their review (Draft EIS, Geotechnical, H&H)	4/28/2010
	Economics	
	Economics Review documents sent to peer reviewers	4/28/2010
	External peer reviewers complete their review (Economics)	5/19/2010
	NPACR	
	Draft NPAC Report sent to peer reviewers	6/1/2010
	External peer reviewers complete their review (Draft NPAC Report)	6/22/2010
Prepare Final Panel Comments and Final IEPR Report	Draft EIS, Geotechnical, and H&H	
	Battelle provides peer reviewers merged individual comments and talking points for panel review teleconference (Draft EIS, Geotechnical, H&H)	5/6/2010
	Convene panel review teleconference (H&H)	5/10/2010
	Convene panel review teleconference (Draft EIS)	5/11/2010
	Convene panel review teleconference (Geotechnical)	5/12/2010
	Battelle provides final panel comment directive to panel (Draft EIS, Geotechnical, H&H)	5/13/2010
	External peer reviewers provide final panel comments to Battelle (Draft EIS, Geotechnical, H&H)	5/18/2010
	Battelle provides feedback to peer reviewers on final panel comments/panel provides revised final panel comments per Battelle feedback (Draft EIS, Geotechnical, H&H)	5/20/2010
	Final Panel Comments finalized (Draft EIS, Geotechnical, H&H)	5/26/2010
	Economics	
	Battelle provides talking points for panel review teleconference (Economics)	5/26/2010
	Convene panel review teleconference (Economics)	5/28/2010
	Battelle provides final panel comment directive to panel (Economics)	6/1/2010
	External peer reviewers provide final panel comments to Battelle (Economics)	6/8/2010
	Battelle provides feedback to peer reviewers on final panel comments/panel provides revised final panel comments per Battelle feedback (Economics)	6/10/2010
	Final Panel Comments finalized (Economics)	6/16/2010
	NPACR	
	Battelle provides peer reviewers merged individual comments and talking points for panel review teleconference (NPAC)	6/25/2010
	Convene panel review teleconference (NPACR, ALL)	6/28/2010
	Battelle provides final panel comment directive to panel	6/29/2010
	External peer reviewers provide final panel comments to Battelle	7/6/2010
	Battelle provides feedback to peer reviewers on final panel comments/panel provides revised final panel comments per Battelle feedback	7/8/2010
	Final Panel Comments finalized	7/12/2010
Comment/Response Process	Battelle provides Final IEPR report to panel for review	7/14/2010
	Panel provides comments on Final IEPR report	7/16/2010
	*Submit Final IEPR Report	7/19/2010
	Input final panel comments to DrChecks	7/20/2010
	USACE PDT provides draft Evaluator responses and clarifying questions to Battelle	7/22/2010
	Battelle provides peer reviewers the draft Evaluator responses and clarifying questions	7/23/2010
	Peer reviewers provide Battelle with draft BackCheck responses	7/26/2010
	Teleconference with Battelle and peer reviewers to discuss panel's draft Backcheck responses	7/26/2010
	Final Panel Comment Teleconference between Battelle, IEPR team, and PDT to discuss final panel comments, draft responses and clarifying questions	7/26/2010
	USACE inputs final Evaluator responses in DrChecks	7/28/2010
	Battelle provides Evaluator responses to peer reviewers	7/29/2010

CHARGE FOR PEER REVIEW

Members of this peer review panel are asked to determine whether the technical approach and scientific rationale presented in the Draft Natomas Post-Authorization Change Report and Environmental Impact Statement are credible and whether the conclusions are valid. The reviewers are asked to determine whether the technical work is adequate, competently performed, properly documented, satisfies established quality requirements, and yields scientifically credible conclusions. The panel is being asked to provide feedback on the economic, engineering, and NEPA impact assessment. The reviewers are not being asked whether they would have conducted the work in a similar manner.

Specific questions for the panel members (by report section or Appendix) are included in the general charge guidance, which is provided below.

General Charge Guidance

Please answer the scientific and technical questions listed below and conduct a broad overview of the Draft Natomas Post-Authorization Change Report and Environmental Impact Statement. Please focus on your areas of expertise and technical knowledge. Even though there are some sections with no questions associated with them, that does not mean that you cannot comment on them. Please feel free to make any relevant and appropriate comment on any of the sections and appendices you were asked to review. In addition, please note the following guidance. Note that the panel will be asked to provide an overall statement related to 2 and 3 below per USACE guidance (EC 1165-2-209; Appendix D).

1. Your response to the charge questions should not be limited to a “yes” or “no.” Please provide complete answers to fully explain your response.
2. Assess the adequacy and acceptability of the economic and environmental assumptions and projections, project evaluation data, and any biological opinions of the project study.
3. Assess the adequacy and acceptability of the economic analyses, environmental analyses, engineering analyses, formulation of alternative plans, methods for integrating risk and uncertainty, and models used in evaluation of economic or environmental impacts of the proposed project.
4. If appropriate, offer opinions as to whether there are sufficient analyses upon which to base a recommendation.
5. Identify, explain, and comment upon assumptions that underlie all the analyses, as well as evaluate the soundness of models, surveys, investigations, and methods.
6. Evaluate whether the interpretations of analysis and the conclusions based on analysis are reasonable
7. Please focus the review on assumptions, data, methods, and models.

Please **do not** make recommendations on whether a particular alternative should be implemented, or whether you would have conducted the work in a similar manner. Also please **do not** comment on or make recommendations on policy issues and decision making.

Comments should be provided based on your professional judgment, **not** the legality of the document.

1. If desired, panel members can contact one another. However, panel members **should not** contact anyone who is or was involved in the project, prepared the subject documents, or was part of the USACE Independent Technical Review.
2. Please contact the Battelle deputy project manager (Ann Louise Sumner, sumnera@battelle.org) or project manager (Karen Johnson-Young, johnson-youngk@battelle.org) for requests or additional information.
3. In case of media contact, notify the Battelle project manager immediately.
4. Your name will appear as one of the panelists in the peer review. Your comments will be included in the Final IEPR Report, but will remain anonymous.

Please submit your comments in electronic form to Ann Louise Sumner, sumnera@battelle.org, no later than 6:00 pm EDT on the dates provided in the schedule.

**Independent External Peer Review
Natomas Post-Authorization Change Report (NPACR)
American River Watershed, California
Common Features Project**

**Final Charge Questions
Optional Increment**

GENERAL QUESTIONS

1. Are the assumptions that underlie the economic, engineering, and environmental analyses sound?
2. Comment on the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used.
3. In general terms, are the planning methods sound?
4. Are the interpretations of analysis and conclusions reasonable?

MAIN REPORT

1. Please comment on the completeness and clarity of the study purpose, scope, goals and objectives.
2. Please comment on whether the report clearly identifies the relationship of the subject project to the overall comprehensive flood management system.
3. Please comment on whether the report clearly presents sufficient background and historical information on development of the subject project with respect to the overall flood risk management system.
4. Please comment on whether the problems, opportunities, parameters and/or conclusions associated with other major projects within the watershed are clearly outlined.
5. Please comment on the viability of the public's concerns about new study alternatives.
6. Please comment on the completeness, accuracy, and consistency of the levee stability discussion.
7. Please comment on the completeness, accuracy, and consistency of the levee overtopping discussion.

8. Please comment on the consideration of vegetation and maintenance of vegetation during the hydraulic analysis.
9. Please comment on the completeness, accuracy, and consistency of this section with regards to the Geotechnical Deterministic and Risk Based Analysis.
10. Based upon review of the technical appendices, comment on the technical viability and appropriateness of the measures considered for reducing flood risk in the Natomas Basin.
11. Based upon review of the technical appendices, comment on the technical viability and appropriateness of the final array of alternatives evaluated for reducing flood risk in the Natomas Basin.
12. Based upon review of the technical appendices, comment on the technical considerations contained in the rationale for eliminating certain alternatives from further consideration.
13. Do the data, analyses, and determinations presented in the technical appendices reasonably and adequately support the discussions and conclusions in the Main Report?

NPACR APPENDIX A: Draft Environmental Impact Statement and Appendices

GENERAL

1. Are the assumptions that underlie the environmental analyses sound?

CHAPTER 1 – NEED FOR PROPOSED ACTION

2. Is the Purpose and Need clearly stated?

CHAPTER 2 – ALTERNATIVES

3. Comment on whether the future environmental conditions under the No-Action Alternative are accurately portrayed
4. Comment on the methods used to compare the alternatives.
 - a. What, if any, additional parameters should be considered?
5. Are the criteria used to evaluate and screen the alternatives clearly stated?
 - a. Are the criteria used to evaluate and screen the alternatives appropriate?
 - b. Why or why not?

6. Comment on the validity of basic assumptions for the alternatives.

CHAPTER 3 - AFFECTED ENVIRONMENT

7. Has the affected environment been adequately described?
8. Should any other factors be considered for the affected environment?
 - a. If so, which?
9. Comment on whether the “project area” and “study area,” as described in the introduction to Chapter 1 and depicted in Plates 1-1, 1-2, and 1-3, have accurately established spatial boundaries.
10. Comment on the accuracy and comprehensiveness of the discussion of Land use in the study area.
11. Comment on the accuracy and comprehensiveness of the discussion of Biological Resources in the study area.
12. Comment on the accuracy and comprehensiveness of the discussion of air quality in the study area.
13. Comment on the accuracy and comprehensiveness of the discussion of noise in the study area.
14. Comment on the accuracy and comprehensiveness of the discussion of Transportation and Circulation in the study area.
15. Comment on the accuracy and comprehensiveness of the discussion of vegetation in the study area.
16. Comment on the accuracy and comprehensiveness of the discussion of fish and wildlife resources in the study area.
17. Comment on the accuracy and comprehensiveness of the discussion of threatened and endangered species in the study area.

CHAPTER 4 – ENVIRONMENTAL CONSEQUENCES

18. Have the environmental consequences of all alternatives been adequately discussed?
 - a. If not, please, discuss.
19. Should any additional environmental impacts of the project be considered?
 - a. If so, please, elaborate.

20. Are there any additional environmental consequences that should be considered for the water detention areas?
 - a. Specifically, should impacts to groundwater hydrology be considered?
21. Comment on the accuracy and comprehensiveness of the discussion of Land use quality-related environmental consequences for the project alternatives (including the no-action alternative).
22. Comment on the accuracy and comprehensiveness of the discussion of Biological quality-related environmental consequences for the project alternatives (including the no-action alternative).
23. Comment on the accuracy and comprehensiveness of the discussion of air quality-related environmental consequences for the project alternatives (including the no-action alternative).
24. Comment on the accuracy and comprehensiveness of the discussion of noise related environmental consequences for the project alternatives (including the no-action alternative).
25. Comment on the accuracy and comprehensiveness of the discussion of transportation and circulation-related environmental consequences for the project alternatives (including the no-action alternative).
26. Comment on the accuracy and comprehensiveness of the discussion of farmland-related environmental consequences for the project alternatives (including the no-action alternative).
27. Comment on the accuracy and comprehensiveness of the discussion of vegetation-related environmental consequences for the project alternatives (including the no-action alternative).
28. Comment on the accuracy and comprehensiveness of the discussion of fish and wildlife-related environmental consequences for the project alternatives (including the no-action alternative).
29. Comment on the accuracy and comprehensiveness of the discussion of threatened and endangered species-related environmental consequences for the project alternatives (including the no-action alternative).

CHAPTER 5 – CUMULATIVE IMPACTS ANALYSIS

30. Comment on the cumulative impacts assessment, including whether all relevant factors were considered and whether the cumulative impacts were accurately assessed.
31. With regard to the cumulative impacts discussion, comment on the completeness of the descriptions of past and present actions.

32. Comment on the completeness of the descriptions of reasonably foreseeable future actions with regard to the cumulative impacts discussion.
33. Comment on how the cumulative effects analysis was conducted and whether the results are reliable and accurate for all aspects of the project.

CHAPTER 6 – CONSISTENCY WITH STATE AND FEDERAL REGULATIONS

34. Comment on the regulation compliance assessments in this section.

CHAPTER 7 – CONSULTATION AND COORDINATION

35. Was adequate public involvement conducted?

NPACR APPENDIX B: Hydrology

1. Please comment on the approach for generating peak flow frequency curves for Dry and Arcade Creeks.
2. Please comment on development of balanced hydrographs for Dry and Arcade Creeks.

NPACR APPENDIX C: Hydraulic Design

1. Comment on use of HEC-RAS and FLO-2D as tools used for floodplain delineation. (Section 1.3)
2. Comment on use of NGVD'29 vertical datum in the HEC-RAS model. (Section 2.2)
3. The assumption was made to proceed with existing topography/cross sections of the NEMDC and NCC and the use of a storage area within HEC-RAS to model the Pleasant Grove Creek Canal. Was this an appropriate approach? (Section 2.2.2)
4. Comment on HEC-RAS modeling of the 2006 event for model validation. Does the validation support previous calibration efforts? Is there enough information to verify? (Section 2.2.3)
5. Comment on the assumption made in regards to the Dry Creek Pump Station Operation. Is the assumption of 2 pumps appropriate for determining an expected water surface? (Section 2.2.2.3)
6. Comment on procedure for the downstream boundary condition. Was it appropriate for this level of study? (Section 2.4)

7. The description of the various modeling scenarios could be confusing; is it understandable? (Section 2.5)
8. The levee failure methodology approach was different than previous studies, specifically the trigger elevation being set based upon the peak stage. Is this appropriate for generating a stage-damage curve? (Section 2.6.1)
9. Comment on the assumption of 500' for the breach width. Is this assumption adequate for a feasibility level study? (Section 2.6.2)
10. An assumption was made in placement of the breach hydrograph in the FLO-2D model. Is this appropriate for determining an average condition for the reach? (Section 2.6.2)
11. Was the process for developing the stage-damage curves through floodplain delineation appropriate? (Section 3)
12. Comment on the overall approach considering the “system” Risk Analysis. (Section 4)
13. No hydraulic impacts were assumed; is this an appropriate assumption? (Section 4)
14. Was the guidance on generating hydraulic uncertainty appropriately followed? (Section 4.2.1)
15. Comment on the assumption in regards to upstream levee performance. (Section 4.3.3)
16. Comment on the assumption in regards to residual flooding. (Section 4.3.4)
17. Comment on assumption that there are no changes in interior flooding as a result of the project. (Section 4.3.7)
18. Comment on the overall layout and presentation of the document.

NPACR APPENDIX F: Geotechnical Analysis

GENERAL

1. Please comment on the organization and structure of the report.
2. Please comments on the subsurface data and whether they are sufficient and adequate for a feasibility level study.
3. Please comment on the adequacy of the selection of critical cross section for each reach.

4. Please comment on whether the longitudinal extent of the critical levee sections has been appropriately delineated.
5. Please comment on the adequacy of the risk based analysis for the existing conditions.
6. Please comment on the proposed remediation measures and whether they are adequate and properly addressed.

1. INTRODUCTION

7. Please comment on whether or not the primary goal of the geotechnical evaluation has been met.

2. SOURCES OF INFORMATION

8. Have all key sources of available subsurface and geomorphologic information been accessed, reviewed and identified?

3. GENERAL LEVEE DESCRIPTION

9. Are the geographical locations of the levee units and clearly identified?
10. Please comment on whether the existing conditions of the surface, subsurface, and performance and reliability have been thoroughly and systematically described using text and illustrations.

4. FOUNDATION CONDITIONS

4.2 Geomorphologic Features

11. Please comment on the discussion of former channels, meanders, oxbows, and point bars with regards to levee stability and critical reach identification.

4.3 Levee and Foundation Geotechnical Conditions

12. Please comment on whether the foundation conditions have been adequately and accurately described in terms of stratigraphic profile, soil layers, and groundwater characteristics.

5.0 EXISTING CONDITIONS GEOTECHNICAL RISK AND UNCERTAINTY ANALYSIS

13. Please comment on the general method used for determination of risk and uncertainty of the existing conditions of the levees.

5.2 Underseepage Reliability

14. Please comment on the general method for determination of probability of failure due to underseepage through the levee foundation for the existing conditions of the levees.

5.3 Slope Stability Reliability

15. Please comment on the general method for determination of probability of failure due to instability of the levee slopes for the existing conditions of the levees.

5.4 Judgment Base Reliability Analysis

16. Please comment on the general method for determination of other factors contributing the probability of failure of the existing levees such as erosion, encroachments, vegetation, animal burrows, and utility penetrations.
17. Please comment on expert elicitation conclusion.

5.5 Combined Reliability Analysis

18. Please comment on the determination of the cumulative effect of all factors contributing to probability of failure of the existing levees.

5.6 Results of the Reliability Analysis

19. Please comment on the resulting probability of failure for different reaches throughout the system.

6. LEVEE IMPROVEMENT

6.1 General

20. Please comment on geotechnical mitigation features.

6.2. Water Elevations

21. Please comment on adequacy of selected water elevation for analyses.

6.3 Seepage Analyses

22. Please comment on criteria, assumptions, parameters used for deterministic analyses.

6.4 Stability Analyses

23. Please comment on criteria, assumptions, parameters used for deterministic stability analyses.
24. Please comment on adequacy of liquefaction assessment.

6.5 Proposed Geotechnical Mitigation Features

25. Please comment on proposed alternatives.
26. Please comment on adequacy of the seepage and stability mitigation features for each alternative.

6.6. Deterministic analyses of Mitigation Features

27. Please comment on assumptions made, parameters used and accuracy of geotechnical deterministic analyses for the mitigation features.

7. Risk and Uncertainty Analyses for Mitigation Features.

28. Please comment on the results of the risk and uncertainty analyses of the mitigation features.

NPACR APPENDIX H: ECONOMICS

1. Comment on the economic analysis purpose and objectives.
2. Comment on the background information provided regarding the American River Common Features (ARCF) study.
3. Comment on the background information provided regarding the Natomas Basin impact area.
4. Comment on the development of the base economic structure/content inventory data used in the economic analysis.
5. Comment on the application of the economic inventory used in the economic analysis.
6. Please provide comments that speak to the documentation of the methodologies/ techniques used in the economic analysis.
7. Please provide comments that speak to the specific methodologies/techniques used to perform the economic analysis.
8. Comment on the use of nine index points to represent the project study area in performing the economic analysis.
9. Comment on the assumptions used in the economic analysis.
10. Comment of the application(s) of the hydrologic, hydraulic, and geotechnical engineering data.
11. Comment on the without-project condition results per index point.
12. Comment on the assumed without-project condition used as the basis for the incremental benefit analysis.
13. Comment on the approach (evaluation of probability of flooding, floodplain assignments) used to perform the incremental benefit analysis.

14. Comment on the incremental benefit analysis in terms of clarity and technical soundness.
15. Comment on the results of the incremental benefit analysis.
16. Comment on the net benefit and benefit-to-cost analysis in terms of cost data inputs, clarity of explanation, and technical soundness.
17. Comment on the results of the net benefit and benefit-to-cost analyses.